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THIS ISSUE CONTAINS:

HS-015 530-553; 555-618; 620-667

HS-801 201; 286; 290; 293; 295; 302; 306-307; 309-311; 313-314; 316;

325-333; 336; 338-340; 342-343; 366

*Shelve in Stacks  
S.B.T.*

# Highway Safety Literature

...A MONTHLY ABSTRACT JOURNAL

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Documents listed in **Highway Safety Literature** are not available from the National Highway Traffic Safety Administration unless so specified. They must be ordered from the sources indicated on the citations, usually at cost. Ordering information for the most common sources is given below.

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**Corporate author:** Inquiries should be addressed to the organization listed in the individual citation.

**Reference copy only:** Documents may be examined at the NHTSA Technical Reference Division or borrowed on inter-library loan through your local library.

**See publication:** Articles in journals, papers in proceedings, or chapters in books are found in the publication cited. These publications may be in libraries or purchased from publishers or dealers.

**SAE:** Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

**TRB:** Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W. Washington, D.C. 20418.

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**National Highway Traffic  
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400 7th Street, S.W.  
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## **ABSTRACT CITATIONS**

HS-015 530

## **TRAFFIC CONTROL IN URBAN AREAS**

Analysis of the urban conflict situation is presented by way of a cost benefit decision model in which budgetary costs only are considered as costs and advantageous and disadvantageous social consequences are mentioned only in a qualitative sense as positive and negative benefits. Variables taken into account include the field of conflicts (traffic flow), manner of control, travel time and travel costs of the road user, capacity, increase of traffic safety, traffic noise, air pollution, influences on the use of space, and costs of signal lights, information handling and collection, and data transmission. Cost levels for a town of 30,000 are tabulated in terms of initial costs (control devices and installation, reconstruction), and annual costs for energy, maintenance, and adjustments.

by P. A. M. Van der Wolf  
Raadgevend Bureau van der Wolf B. V., Rotterdam  
(Netherlands)  
Publ: CONTROLLED TRAFFIC, Amsterdam, 1974 p85-100  
1974  
Final Programme Paper presented at the Intertraffic 74  
International Congress on Traf. Engineering, Amsterdam, 15-  
16 May 1974.  
Availability: International Congress Centre RAI, Amsterdam,  
The Netherlands

HS-015 531

## **WARRANTS FOR TRAFFIC SIGNAL INSTALLATIONS. APPENDIX. VOLUME CRITERIA**

Decision making processes and their accompanying mathematical analyses are presented for traffic signal installations. Factors considered include: capacity of the intersection for vehicular traffic; existing traffic movements; presence of a priority control; intersection visibility; geometrical layout of the intersecting roads; accident investigation; pedestrian crossings; and school crossings.

by P. A. M. Van der Wolf; A. P. Gelsing  
Raadgevend Bureau van der Wolf B. V., Rotterdam  
(Netherlands)  
Publ: CONTROLLED TRAFFIC, Amsterdam, 1974 p101-12  
1974 ; 17refs  
Final Programme Paper presented at the Intertraffic 74  
International Congress on Traf. Engineering, Amsterdam, 15-  
16 May 1974.  
Availability: International Congress Centre RAI, Amsterdam,  
The Netherlands

HS-015 532

## **TRAFFIC CONTROL ON MOTORWAYS**

Motorway conditions in the Netherlands are detailed and the development of traffic control systems for them is discussed. The increase in vehicle usage and the resulting problems are reviewed, and three types of traffic control systems are outlined: systems which automatically interfere with the steering of the car, those which operate with auditory warning devices, and those with visual indicators. General requirements are recommended for control systems, including reliability, quick reactions to dangerous situations, and relevant and unequivocal

warning. Three main elements of traffic control system are stressed: detection (perceptions relating to traffic, road and weather); decision criteria (interpretation of perceptions and signalling (transfer of information to the road user). Detailed characteristics of the systems are given, along with considerations of expenditures and effects.

by B. Beukers  
Netherlands Ministry of Transport en Waterstaat, Hague  
Publ: CONTROLLED TRAFFIC, Amsterdam, 1974 p113-28  
1974  
Final Programme Paper presented at the Intertraffic 74  
International Congress on Traf. Engineering, Amsterdam, 15-  
16 May 1974.  
Availability: International Congress Centre RAI, Amsterdam,  
The Netherlands

HS-015 533

## **AN EXAMPLE OF A NEW TRAFFIC SYSTEM**

It is suggested that the means for new roads and new vehicles are available but that substantial problems are created by the demands made by mass application. They render a low eventual cost highly desirable. There also are stringent requirements to be met with regard to introduction, expansion, maintenance and life span. The specifications of the boundaries between vehicle and road, such as the power supply, will have to be clearly determined to take into account future needs. The introduction of a new traffic system also will have to await agreement at European level, being dependent upon worldwide standardization. Experience must first be gained on trial routes, combined with the firm intention to introduce the new system on a general scale.

by J. L. de Kroes  
Technische Hogeschool, Delft (Netherlands)  
Publ: CONTROLLED TRAFFIC, Amsterdam, 1974 p129-56  
1974 ; 11refs  
Final Programme Paper presented at the Intertraffic 74  
International Congress on Traf. Engineering, Amsterdam, 15-  
16 May 1974.  
Availability: International Congress Centre RAI, Amsterdam,  
The Netherlands

HS-015 534

## **CONTROLLED TRAFFIC--AN ECONOMIC APPROACH**

An economic approach to traffic control policy is discussed. Several conclusions are drawn: the need to develop a long term policy is not only desirable hypothetically but essential to keep a country such as the Netherlands livable; it does not seem justifiable to postpone a number of fundamental decisions until the moment that data are available on all relevant relationships; social objectives must be determined; based on an estimation of the budgetary consequences of policy alternatives, decision making should center around those alternatives that are economically feasible; given the existing long term

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certainties, the short and middle term objectives have to be formulated.

by H. J. Noortman  
Nederlands Vervoerswetenschappelijk Instituut, Rijswijk  
Publ: CONTROLLED TRAFFIC, Amsterdam, 1974 p157-66  
1974  
Final Programme Paper presented at the Intertraffic 74  
International Congress on Traf. Engineering, Amsterdam, 15-  
16 May 1974.  
Availability: International Congress Centre RAI, Amsterdam,  
The Netherlands

HS-015 535

**STUDED TIRE PAVEMENT WEAR REDUCTION  
AND REPAIR. PHASE 3: COMPOSITE  
PRESENTATION OF PHASE 1 AND PHASE 2  
RESULTS AND EXTRAPOLATION OF THE  
CONCLUSIONS TO REAL WORLD CONDITIONS.  
FINAL REPORT**

Regression analyses were performed on data on stud type, stud protrusion, speed, air temperature, pavement temperature, environmental conditions, stud harness, and tire tread depth. The purpose was to evaluate the relative importance of these factors on pavement wear. It was found that the type of overlay, the type of stud, and the stud protrusion length were the most important factors affecting pavement wear; the other factors could not be sufficiently isolated to determine their relative importance. Average wear rates were calculated for the different types of pavements and overlays caused by the different stud types. A formula was derived which can be used to calculate pavement life under certain conditions. The results obtained for Phase 1 and Phase 2 of this study were compared and the difference discussed. Some of the difference was due to the different testing conditions between the two phases. A comparison with other associated research was also made. A striping paint study was made and the results are included in this report.

by H. C. Sorensen; M. Krukar; J. C. Cook  
Washington State Univ., Pullman. Coll. of Engineering  
Rept. No. H-41; WSHD-Res-Prog-9.3 ; 1973 ; 188p 31refs  
Prepared for the Washington State Hwy. Commission, in  
cooperation with the Federal Hwy. Administration and the  
Idaho Dept. of Highways. Report for 1 Jul 1973-1 Mar 1974.  
Availability: Transportation Systems Section, College of  
Engineering Res. Div., Washington State Univ., Pullman,  
Wash. 99163

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**THE DRIVER ENVIRONMENT**

Some of the factors in the driver's environment being studied by various groups include injuries resulting from getting into and out of the cab and attaching air and electrical hoses, the control panel, interior noise levels, vibration of the driver, dangerous fumes in the cab, and effects of heat and humidity on the driver. Federal efforts in the driver environment field are reviewed in terms of health consequences and safety standards. Attention is directed toward placement of fifth wheels on tractors, vibration caused driver fatigue and performance

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decrement, standardization of controls, and cab sealing to prevent harmful fumes from entering the truck.

by S. Byczynski  
Publ: FLEET OWNER v69 n9 p71-4 (Sep 1974)  
1974  
Availability: See publication

HS-015 537

**AN EVALUATION OF SOME ADDITIONAL  
FACTORS INFLUENCING THE EFFECTIVENESS OF  
WARNING LETTERS. FINAL REPORT**

The effectiveness of two types of warning letters and an informational pamphlet in reducing the subsequent collision and conviction records of pre-negligent drivers was determined. An additional study objective was to determine the effectiveness of a follow-up reinforcement letter sent to collision and conviction free drivers. The results six months subsequent to treatment showed no significant treatment effects on convictions, but a positive pamphlet effect on collisions. The follow-up reinforcement analysis for collision and conviction free drivers showed no significant treatment effects on collisions. On convictions, however, there was a main effect attributable to type of warning letter as well as an interaction between type of warning letter, pamphlet condition, and follow-up reinforcement. No treatment conditions were significantly influenced by subject characteristics.

by W. V. Epperson; R. M. Harano  
California Dept. of Motor Vehicles, Sacramento  
Contract FHWA-A13307  
Rept. No. CAL-DMV-RSS-74-45 ; 1974 ; 25p 6refs  
Sponsored by the Calif. Div. of Hwys., Sacramento, in  
cooperation with the Federal Hwy. Administration.  
Availability: Dept. of Motor Vehicles, Res. and Statistics  
Section, P. O. Box 1828, Sacramento, Calif. 95809

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**MOTOR TRUCK FACTS 1974**

Statistics presented in a reference booklet indicate that motor truck production and use in the U. S. increased during 1973 in spite of the economic downturn, and that the use of light trucks for personal transportation and recreational purposes continued to grow. A section on production and registration offers data on: bus and truck bodies; truck emissions; factory sales; optional equipment; retail sales; retirement and recycling; tire shipments; and truck trailers. A section on use and owners deals with farm vehicles, fleets, government ownership, purpose of truck usage, county registrations, school bus transportation, shipment of goods and modes, and vehicle miles of travel. The economic impact is presented in terms of employment, franchised new truck dealers, gross national product, highway trust fund, imports and exports, payrolls, taxes, and truck safety.

Motor Vehicle Manufacturers Assoc. of the United States,  
Inc., Detroit, Mich.  
1974 ; 61p  
Availability: Statistics Dept., Motor Vehicle Manufacturers  
Assoc., 320 New Center Bldg., Detroit, Mich. 48202



April 30, 1975

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#### A NEW APPROACH TO SETTING VEHICLE EMISSION STANDARDS

Urban ambient air quality trend analysis was evaluated as an alternative to rollback analysis to estimate vehicle emission standards needed to achieve national ambient air quality standards. Examination of the trends of monthly maximum eight-hour average carbon monoxide (CO) concentrations, central business district traffic activity, and emission rates from vehicles on the road suggests that the automotive exhaust emission standard for carbon monoxide derived in response to the Clean Air Act Amendments of 1970 may be 10 times too severe. The excessive stringency of the vehicle emission standard for CO was confirmed by two different analyses of the correlation between annual mean CO concentration and frequency of occurrence of CO concentrations above the level of the eight-hour standards. One correlation involved an empirical approach and the other assumed that CO concentrations are described by the lognormal distribution. It was found that a vehicle CO emission standard of approximately 29 grams per mile appears adequate to meet the ambient air quality standard. The large difference between the results of this analysis and the 1976 Federal vehicle CO emission standard indicates the advisability of applying this methodology to verification of the standards for hydrocarbons and oxides of nitrogen.

by J. M. Pierrard; R. D. Sneek; J. Zelson  
Publ: JOURNAL OF AIR POLLUTION CONTROL  
ASSOCIATION v24 n9 p841-8 (Sep 1974)  
Rept. No. Paper-73-75-Rev ; 1974 ; 15refs  
Revised, Presented at the 66th Annual Meeting of APCA,  
Chicago, Jun 1973.  
Availability: See publication

HS-015 540

#### AMBIENT AIR QUALITY AND AUTOMOTIVE EMISSION CONTROL

Ambient air quality was projected by assuming a linear dependence on estimated future emissions, which were estimated by a method approved by EPA. Projections were made for the locations reported to have the highest ambient air concentrations of each pollutant; Chicago for carbon monoxide (CO) and the California South Coast Air Basin for hydrocarbon and oxidant. The sensitivity of the projections to several input parameters was determined. The uncertainty in projection of air quality due to the use of a maximum, once-per-year concentration is large. For example, the reduction in total CO emissions in Chicago in 1975, necessary to meet the air quality standard, was as high as 68% or as low as 26%, depending on whether the historic high, 8 hr average concentration of 44 ppm or the 1970 maximum of 21 ppm was used. The effects of uncertainties in growth rates and fraction of emissions attributed to the automobile were also sizable. Differences in automotive growth rate had a large near-term effect on projected concentrations, while difference in nonautomotive growth rate or fraction of emissions attributed to the automobile had a large long-term effect. The effect of 1975 interim automotive emission standards on projected air quality was negligible when

compared with projected air quality based on the previous Federal automotive emission standards for 1975.

by W. A. Daniel; J. M. Heuss  
Publ: JOURNAL OF AIR POLLUTION CONTROL  
ASSOCIATION v24 n9 p849-54 (Sep 1974)  
Rept. No. Paper-73-72 ; 1974 ; 19refs  
Presented at the 66th Annual Meeting of APCA, Chicago, Jun 1973.  
Availability: See publication

HS-015 541

#### UNIFORM MOTOR VEHICLE ACCIDENT REPARATIONS ACT

Provisions of the Uniform Motor Vehicle Accident Reparations Act are presented with a prefatory note and comments included. The Act creates a complete system of reparations for injuries and loss arising from vehicle accidents. To a large extent, though not completely, economic losses would be compensated without regard to fault through first party insurance coverages and tort liability for those losses would be abolished. Details are given on: basic reparation benefits; denial or restriction of benefits to certain persons; tort exemptions and retained tort liabilities; security for basic reparation benefits and tort liability, priority of source; assigned claims plan; added coverages; assigned risks; territorial reach of the Act; payment of benefits; attorney's fees; reallocation of costs; and cancellation and nonrenewal of insurance.

National Conference of Commissioners on Uniform State  
Laws, Chicago, Ill.  
1972 ; 85p  
Presented at the Annual Conference Meeting, San Francisco,  
4-11 Aug 1972.  
Availability: National Conference of Commissioners on  
Uniform State Laws, 1155 East 60th St., Chicago, Ill. 60637

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#### TWINSONIC LIGHT STUDY

The effect on motorists' behavior of a new twinsonic warning lamp system on police vehicles was measured, and the twinsonic lighting system was compared to the lighting systems tested during the Blue Light Study. The twinsonic/red/blue lighting system was found to be more effective than the dual amber lights in moving traffic to lanes farther away from the patrol vehicle in both daylight and darkness. In daylight, the dual amber lights consistently evoked a greater speed reduction than the twinsonic lighting system; in darkness, the performance of the twinsonic lighting system tended to improve, although there was not a significant difference between the two systems in speed reduction. When the twinsonic red/blue lighting system was compared to the lights tested during the Blue Light Study, it was found that the red and blue strobe lights ranked above the twinsonic in terms of speed reduction, and that the twinsonic and the blue strobe light were about equal in moving traffic away from the patrol vehicle.

California Dept. of Hwy. Patrol, Sacramento  
1973 ; 26p  
Availability: Reference copy only

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**ANALYSIS OF DUAL MODE SYSTEMS IN AN URBAN AREA. VOL. 1: SUMMARY. FINAL REPORT**

Various forms of dual mode transportation were analyzed to assess the economic viability of the concept. A dual mode vehicle is defined as one which operates under manual control on a street network for some portion of its trip, and operates under automatic control on an exclusive guideway for some other portion. Specially designed new small dual mode vehicles, modifications of existing automobiles, and pallet systems, all operating in conjunction with dual mode buses, were examined. The study was conducted in a Boston 1990 scenario, in which an extensive dual mode system providing service for the entire urban region was presumed to exist. The following conclusions are considered to be generally applicable to other large urban areas as well: Dual mode systems appear to be sufficiently attractive to warrant further technological development; for urban-wide applications, a dual mode system which includes both buses and personal vehicles is more effective than one consisting of either fleet of vehicles alone; and a dual mode transportation system benefits from the use of various dual mode concepts throughout its development. An effective first step might be to install a limited network dual mode minibus system, with capacity for ultimate growth to a longer guideway network with personal vehicles and buses.

by P. Benjamin; J. Barber; R. Favout; D. Goeddel; C. Heaton; R. Kangas; G. Paules; E. Roberts; L. Vance  
Department of Transp., Cambridge, Mass. Transp. Systems Center

Rept. No. DOT-TSC-OST-73-16A, 1 ; 1973 ; 41p 4refs  
Report for Aug 1971 - Aug 1972. See also HS-015 544--HS-015 546.

Availability: NTIS

HS-015 544

**ANALYSIS OF DUAL MODE SYSTEMS IN AN URBAN AREA. VOL. 2: STUDY RESULTS. FINAL REPORT**

This study was to analyze Dual Mode transportation in a representative type of city, relating city characteristics to baseline characteristics. Selection of Boston was made through application of criteria of size, demographic characteristics, transportation supply and transportation data availability. Three generic baselines were used in analysis of Dual Mode systems: the pallet system; the automated highway, and the small vehicle system. A basic Dual Mode network was designed for all baselines, with some adjustments required to meet the peculiarities of specific systems. For the pallet and automated highway vehicle systems, stations are of three different types: vehicle access to and from local street network is forbidden, automobile parking is provided and Dual Mode users can transfer to the existent rapid transit system; vehicle access to local streets is not permitted, parking is provided and there is no direct transit interface since it is within walking distance of the main financial district; or vehicles are permitted access to local streets and transfer to rapid transit and parking is provided. For the small new vehicle baseline, network in the downtown area was structured to provide walking access from the system to all central business district (CBD) points. A large part of the network is tunneled and all vehicles are confined to the guideway in this area. In terms of effect on the regional transportation system, the small base vehicle baseline is the most significant Dual Mode alternative, provid-

ing the fastest regional average trip speed, the greatest reduction of street congestion and the fastest Dual Mode average trip speeds of any of the baselines. The analysis shows that if a Dual Mode system is intended to serve an entire urban area, a fleet of a mix of personal vehicles and Dual Mode buses is considerably more attractive than either of the types of vehicles operating separately. A further analysis should be conducted of land use modifications, industrial development and changes in housing patterns as a result of new transportation implementations.

by P. Benjamin; J. Barber; R. Favout; D. Goeddel; C. Heaton; R. Kangas; G. Paules; E. Roberts; L. Vance  
Department of Transp., Cambridge, Mass. Transp. Systems Center

Rept. No. DOT-TSC-OST-73-16A, 2 ; 1973 ; 241p 27refs  
Report for Aug 1971 - Aug 1972. See also HS-015 543, HS-015 545--HS-015 546.

Availability: NTIS

HS-015 545

**ANALYSIS OF DUAL MODE SYSTEMS IN AN URBAN AREA. VOL. 3: DESCRIPTION OF THE ANALYSIS TECHNIQUES AND DATA SOURCES. FINAL REPORT**

Methodologies used in analysis of the three generic Dual Mode baselines in the city of Boston are detailed. The areas covered include the synthesis of the guideway network estimation of ridership, performance and physical design considerations, impact analysis and the structure of the cost/benefit model. Each of three baselines was measured against Boston's 1990 transportation plan. The baselines are a pallet system, an automated highway vehicle system, and a new small vehicle system. The pallet system consists of special pallets which carry conventional automobiles on the guideway and 20 passenger Dual Mode buses. The use of pallets permits any automobile, without special modification, to use the system. The buses provide public transportation. The pallets and buses are electrically powered. The automated highway system is similar in operation to the pallet, except that automobiles interface directly with the guideway. Buses and automobiles are powered by internal combustion engines. The new small vehicle baseline consists of electrically powered publicly owned Dual Mode minicars and 12-passenger electrically powered Dual Mode minibuses. The 1990 origin/destination data for Boston was used as a basis for the modal split model, which determined for each baseline the Dual Mode, automobile and transit ridership. The Dual Mode ridership was influenced primarily by the fare charged or perceived cost, the time components of a trip, and various operating policies. Ridership data provided capital and operating costs. Parametric analyses were carried out to determine the sensitivity to variations in the input parameters. Results were analyzed, evaluated and summarized as costs and benefits. For each baseline, statistics for the Dual Mode system, the highway system and the transit system were calculated. The results were then compared with those for the 1990 plans for conventional transportation.

by P. Benjamin; J. Barber; R. Favout; D. Goeddel; C. Heaton; R. Kangas; G. Paules; E. Roberts; L. Vance  
Department of Transp., Cambridge, Mass. Transp. Systems Center

Rept. No. DOT-TSC-OST-73-16A, 3 ; 1973 ; 283p 113refs  
Report for Aug 1971 - Aug 1972. See also HS-015 543--HS-015 544, HS-015 546.

Availability: NTIS

HS-015 546

**ANALYSIS OF DUAL MODE SYSTEMS IN AN URBAN AREA. VOL. 3A: APPENDIXES. FINAL REPORT**

Various forms of dual mode transportation were analyzed to assess the economic viability of the concept. Specially designed new small dual mode vehicles, modifications of existing automobiles, and pallet systems, all operating in conjunction with dual mode buses, were examined in a Boston 1990 scenario in which an extensive dual mode system providing service for the entire urban area was presumed to exist. Appendices to the study are provided, covering: mathematical framework of the n-dimensional logit model; dual mode calibration data; ridership estimation; program documentation for ridership estimation model; automated transportation system lane capacity analysis; development of input data for noise impact calculations; and dual mode technology.

by P. Benjamin; J. Barber; R. Favout; D. Goeddel; C. Heaton; R. Kangas; G. Paules; E. Roberts; L. Vance  
Department of Transp., Cambridge, Mass. Transp. Systems Center  
Rept. No. DOT-TSC-OST-73-16A, 3A ; 1973 ; 159p refs  
Report for Aug 1971 - Aug 1972. See also HS-015 543--HS-015 545.

Availability: NTIS

HS-015 547

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF MISSISSIPPI. 1972 ACCIDENT YEAR**

The conversion of Mississippi's state accident data to a uniform accident data tape format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and state materials, including Mississippi Traffic Accident Report, codes for county and urban areas, and the Mississippi Highway Safety Patrol Accident Report Code.

Safety Management Inst., Washington, D. C.  
CONTRACT DOT-HS-021-2-472  
1973 ; 97p  
Availability: Reference copy only

HS-015 548

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF NEBRASKA. 1972 ACCIDENT YEAR**

Nebraska's conversion of state accident data to a uniform accident data tape format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including the Investigator's Motor Vehicle Accident Report, data processing file layout, and the code book for the statistical accident records file layout.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 106p  
Availability: Reference copy only

HS-015 549

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF NEW HAMPSHIRE. 1972 ACCIDENT YEAR**

New Hampshire's conversion of state accident data to a uniform accident data format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including the Report of Motor Vehicle Accident, record layout sheet, and key punch and tape format.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 100p  
Availability: Reference copy only

HS-015 550

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF NORTH DAKOTA. 1972 ACCIDENT YEAR**

North Dakota's conversion of state accident data to a uniform data tape format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including the Motor Vehicle Crash Report, record data sheets, Manual of Coding Instructions, and classification of traffic law violations.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 175p  
Availability: Reference copy only

HS-015 551

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF OHIO. 1972 ACCIDENT YEAR**

Ohio's conversion of state accident data to a uniform accident data format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including COBOL record definition for tape records and for unpacked tape records, and the Traffic Crash Report Coding Manual.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 209p  
Availability: Reference copy only

HS-015 552

**1973 U. S. NATIONAL ROADSIDE BREATHTESTING SURVEY**

This first U. S. national roadside breathtesting survey was conducted at 185 roadside locations in 18 states, with random samples of 3698 motorists stopped between 10 PM and 3AM on eight weekends in the fall of 1973. From these drivers, 3358 interviews and 3192 breath tests were obtained. The basic findings on the extent of drinking and driving during these times were that 22.6% of the drivers in the national sample

were at a 0.02% blood alcohol concentration (BAC) or higher; 13.5% were at a 0.05% BAC or higher; 5.0% were at a 0.10% BAC or higher; and 1.4% were at a 0.15% BAC or higher. The sampling and operational procedures are described and the BAC results are analyzed in relation to several geographic and driver characteristics. It is concluded that such a survey is a valuable means of providing useful evaluative data at a reasonable cost, and 10 operational improvements for such a future survey are suggested.

by A. C. Wolfe  
Contract Ref: DOT-HS-031-3-722  
Publ: HIT LAB REPORTS v4 n11 p1-16 (Jul 1974)  
1974 ; 2refs  
Availability: See publication

## HS-015 553

### **RATING THE SEVERITY OF TISSUE DAMAGE. 2. THE COMPREHENSIVE SCALE**

The Comprehensive Injury Scale for classifying the severity of tissue damage is described in which ratings are objective, examples of injuries are given, and the injuries are separated by major medical specialties. Criteria used in injury scaling are separated into five distinct categories: energy dissipation, threat-to-life, permanent impairment, treatment period, and incidence. Tables are presented to show how the criteria relate to orthopedic injuries. Tables have been completed for other types of injuries, but these are not included. The orthopedic scale lists the major specific injuries that are likely to occur to the human skeletal system in automotive crashes. The age effect is described as an additional factor which can raise or lower the stated severity of the injury by the indication of a plus or minus. A second table relates verbal descriptions to numerical values on a one to five basis. It is suggested that additional scales might be completed for other medical specialties such as psychiatry or cardiology. Still to be completed is the construction of a Cross-Referenced Comprehensive Index which will permit comparisons of injuries in different body systems.

Publ: JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION v220 n5 p717-20 (1 May 1972)  
1972 ; 3refs  
Part 1 is HS-010 714.  
Availability: See publication

## HS-015 555

### **MICHIGAN TRAFFIC ACCIDENT FACTS 1973**

Accident statistics for Michigan are presented which show a 2% decrease in fatalities and a 5.3% decrease in road injuries over the previous year. All exposure factors were up with motor vehicle registrations accounting for a 5.4% increase and licensed drivers increasing by 3.2%. Statistics are given for trends, principle classes of motor vehicle deaths (urban, rural, pedestrian, non-pedestrian); time factors; accident locations; motor vehicle deaths, mileage and rates by month; bicycle, motorcycle, railroad, deer, snowmobile, and farm equipment accidents; vehicle inspection data; guardrail accidents; age of majority accident data; breath testing; persons killed by age; residence of driver; vehicle registrations; speed reports for two, four, and six lane roads and for passenger car and com-

mercial vehicle average speeds; objects hit; accident experience by roadway type; and comparative summaries.

Michigan Dept. of State Police, East Lansing  
1973 ; 58p  
Availability: Michigan Dept. of State Police, 717 S. Harrison Rd., East Lansing, Mich. 48823

## HS-015 556

### **THE LONG-TERM EFFECTS OF MERIT-RATING PLANS ON INDIVIDUAL MOTORISTS**

The effects of being charged annual premiums for automobile bodily-injury insurance in accordance with particular merit rating plans over an individual driver's driving lifetime are examined. Individual accident involvement is modeled as a compound Poisson process and the annual premium amounts as a Markov process. For each plan, the model examines: how well an individual's lifetime premium payments reflect his accident likelihood; the discount that is provided for accident-free drivers; the probability that a driver pays a very high annual premium; and the number of years that lapse before a previous accident no longer affects a driver's premium.

by J. Ferreira, Jr.  
Publ: OPERATIONS RESEARCH v22 n5 p954-78 (Sep-Oct 1974)  
1974 ; 28refs  
Supported in part by the National Science Foundation.  
Availability: See publication

## HS-015 557

### **OPTIMAL CLAIM DECISIONS BY POLICYHOLDERS IN AUTOMOBILE INSURANCE WITH MERIT- RATING STRUCTURES**

Merit-rating structures in automobile insurance systems require the insured to decide whether to file a claim for an accident when he is at fault. This decision can only be analyzed in the light of future developments and future decisions, and must be formulated as a sequential decision process that can be solved by dynamic programming. If future developments are estimated in light of new experience, the decision problem can be analyzed by adaptive programming. The approach is illustrated by sample calculations providing a number of observations that are of interest from the insurance industry's point of view.

by C. H. Von Lanzener  
1974 ; 9refs  
Sponsored by Associates' Workshop in Business Res. 1971, School of Business Administration, Univ. of Western Ontario, London, (Canada).  
Availability: See publication

## HS-015 558

### **NATIONAL SAFETY BELT USAGE CONFERENCE PROCEEDINGS, WASHINGTON, D. C., NOVEMBER 28-30, 1973**

Conference objectives are described as the identification of key action areas for state passage, implementation, and evaluation of mandatory safety belt use laws. To help community leaders and concerned state legislators develop a strategy

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for achieving belt use laws in their states, the conference emphasized the experience of Australia where mandatory laws first became effective in New South Wales and Victoria in 1971. It was resolved by the conference that the concept of safety belt use laws has been demonstrated to be effective in significantly reducing highway deaths and injuries, and that the idea is endorsed by the delegates of the DOT conference. Other topics covered include consumer views, the constitutional issue, interstate commerce, physicians' views, safety campaigns, federal incentives.

National Hwy. Traf. Safety Administration, Washington, D. C.  
1973 ; 126p  
Includes HS-015 559--HS-015 578.  
Availability: NHTSA

HS-015 559

#### KEYNOTE ADDRESS

The role of safety belts in saving lives in highway accidents is stressed and safety belt usage legislation is urged. It is noted that the technology necessary to reduce the death rate is available but that national and individual motivation is needed. Consideration is given to the quality of the highway systems, the growing mix of vehicle types, the energy crisis, and safety standards. The arguments against safety belts are shown to be weak, and it is suggested that there are adequate precedents in law to dispel the notion that any compulsory use of belts would be an unconstitutional infringement of personal liberties.

by C. S. Brinegar  
Department of Transp., Washington, D. C.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p2-7  
1973  
Availability: Bound in HS-015 558

HS-015 560

#### DEATH STALKS: PUBLIC OFFICIALS TALK

The urgency of the need for seat belt usage laws is discussed along with the lack of responsiveness by public officials in encouraging them. Benefits of belt usage are cited, as well as political factors in decision making processes. It is suggested that public decisions must be based on the good and welfare of the people, not on illogical, emotional pressures. The constitutional question involved in mandatory seat belt usage is also explored and found to be unsupported legally, and mention is made of laws concerning air bags and the safety belt interlock system on new cars. Michigan's Conference on Traffic Safety and the Problem Driver is cited as an example of an effective means of promoting traffic safety. Letter writing campaigns are also advocated, and the use of federal funds as incentives to state legislatures is described.

by R. H. Austin  
Michigan Dept. of State, Lansing  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p9-14  
1973  
Availability: Bound in HS-015 558

HS-015 561

#### THE KEY TO ACHIEVING SAFETY BELT LAWS-- CITIZEN SUPPORT

Methods of private sector group help to further the enactment of seat belt use laws are discussed. It is suggested that these groups can better provide the necessary impetus to generate adequate public and legislative support that conventional approaches have failed to produce. Public resistance to bureaucratic compulsory decision making is cited. Private sector groups are thought to be more persuasive than engineers, manufacturers, or traffic safety agencies in convincing the public that the new seat belts are more effective. Examples of such persuasion are described, and a manual is proposed which would outline step-by-step procedures for reaching the public through talks, visual aids, workshops, newsletters, meetings, etc.

by M. Gnau  
National Assoc. of Women Hwy. Safety Leaders  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p15-9  
1973  
Availability: Bound in HS-015 558

HS-015 562

#### THE CONSUMER VIEWS SAFETY BELT LAWS

Case histories are cited to illustrate the benefits of seat belt usage and the tragedies of failure to use them. Consumer attitudes on the safety belt laws are discussed, including the interlock system, and design problems are described. It is suggested that some of these problems will be eliminated as time passes, and that the problem at hand is to convince the public to use the safety devices. The establishment of Kangaroo Clubs is described, which promote the use of safety belts and the interlock system.

by V. Knauer  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p20-4

Availability: Bound in HS-015 558

HS-015 563

#### AUSTRALIA'S SAFETY BELT USE LAWS: THE INTRODUCTION OF THE LAW

Mandatory seat belt usage in Australia is discussed and national similarities between Australia and the U. S. are cited, with emphasis on the government role in promoting traffic safety. Evidence regarding the effectiveness of seat belts is mentioned along with methods for encouraging favorable public opinion. Exemptions to the seat belt law were granted to some delivery men, persons exempted by a doctor's certificate, and persons reversing vehicles. The legislation is not applied to children under age eight. The penalty for noncompliance was a maximum fine of \$20 (Australian). Instances of

noncompliance are described, but general support for the law is emphasized.

by R. J. Barling  
Australia Dept. of Transport, Canberra, A.C.T.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p25-30

Availability: Bound in HS-015 558

HS-015 564

#### **AUSTRALIA'S SAFETY BELT USE LAWS: THE RESULTS OF THE LAW**

The impact of Australia's seat belt usage law is described in terms of: effect of the legislation on belt usage; effect on the number of injuries and fatalities; effect on the pattern of injury in Victoria; enforcement procedures and penalties (fines) for noncompliance. Statistics are cited which indicate beneficial effects of the legislation, such as substantially increased seat belt usage rates and significantly decreased driver and passenger fatalities. It is concluded that there is still scope for more enforcement, education, and improved seat belt design to maximize the effectiveness of the legislation.

by P. Vulcan  
Australia Dept. of Transport, Canberra, A.C.T.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p31-40  
1973

Availability: Bound in HS-015 558

HS-015 565

#### **AUSTRALIA'S SAFETY BELT USE LAWS: MEDIA'S ROLE IN BUILDING SUPPORT FOR BELT LAWS**

The role of the news media in promoting support for Australia's safety belt usage law is discussed in terms of formulating ways to create a community awareness of the value of seat belts, to persuade legislators to act, and to persuade the community generally to accept, want, and demand this type of legislation. Details of the legislation in Victoria are given and the resulting benefits are cited, including a dramatic reduction in fatalities. It is noted that fatalities and injuries to children under age six have not decreased, and that the law in Victoria does not apply to children under eight due to the difficulty in finding seat belts that will adjust properly for small children. Emphasis is placed on communication as a means of persuasion, utilizing photographs, tabloid lift-outs, and details of accidents.

by G. Taylor  
The Age, Melbourne Vic. (Australia)  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, WASHINGTON, D. C.,  
1973 p41-8  
1973

Availability: Bound in HS-015 558

HS-015 566

#### **THE CONSTITUTIONAL CASE FOR SAFETY BELT USE LAWS**

Legal issues related to proposed legislation making seat belt usage mandatory are discussed, with emphasis on the constitutionality of the statutes. It is noted that several federal courts and half the state courts have ruled favorably on the constitutionality of state and municipal requirements that motorcyclists wear protective goggles or helmets. The legal principles upon which those cases have been decided are sufficiently similar to the rules which will apply to the seat belt statutes. Specific court decisions are cited, including one in Massachusetts which points out that the laws do not affect only the driver but also other people injured in the accident, medical personnel, and/or the state in terms of unemployment compensation or family assistance.

by J. Barnum  
Department of Transp., Washington, D. C.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p49-52  
1973 ; 1ref  
Availability: Bound in HS-015 558

HS-015 567

#### **IMPLEMENTING PUERTO RICO'S LAWS**

Traffic safety legislation in Puerto Rico is described with emphasis on mandatory safety belt usage. Procedures used in developing the law are outlined along with surveys on seat belt usage, installation, and public opinion. Activities of an Implementation Committee are reviewed, including revision of federal and local legislation related to the proposed legislation; public hearings; public information programs; evaluation of traffic safety campaign proposals; meetings with civic and religious groups and radio and television program presentations; and data acquisition and analysis. An Office of Implementation is recommended.

by D. Hernandez  
Puerto Rico Dept. of Transp. and Public Works, San Juan  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p53-7  
1973

Availability: Bound in HS-015 558

HS-015 568

#### **REQUIRED SAFETY BELTS FOR DRIVERS IN INTERSTATE COMMERCE**

The impact of seat belt usage laws on interstate commerce drivers is discussed, and the need for and the potential effectiveness of requiring passengers and drivers of all motor vehicles to wear safety belts is emphasized. Manufacturers' response to installation requirements are described along with drivers' initial reactions. Statistics are cited which indicate fatality causes (such as ejection) and the lack of effectiveness of improved door latches. Penalties (fines) for noncompliance and spot checking procedures are described. It is noted that studies indicate that seat belted drivers of commercial vehicles are more than four times less likely to be fatally injured if in-

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involved in an accident than those who are not wearing seat belts.

by N. T. Tiemann  
Federal Hwy. Administration, Washington, D. C.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p58-62  
1973  
Availability: Bound in HS-015 558

HS-015 569

#### **PANEL DISCUSSION--PHYSICIANS VIEW SAFETY BELT USE**

Activities of the American Association for Automotive Medicine, a group of physicians, engineers, psychologists, and other professionals in the field of automotive safety, are described in relation to seat belt usage. It is noted that no injuries have been found which were made worse by a belt system. Photographs are included showing how belted drivers were protected in accidents involving rollovers, fire, and high speed. Arguments against belt usage because of fire, immersion in water, and neck injuries are refuted. Inconveniences in belt design are cited, but are found to be improving. Educational efforts are advocated for public acceptance of both safety belts in general and interlock systems in particular.

by J. States  
American Assoc. for Automotive Medicine  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p63-8  
1973  
Availability: Bound in HS-015 558

HS-015 570

#### **PANEL DISCUSSION--PHYSICIANS VIEW SAFETY BELT USE**

The role of physicians in promoting automotive safety is discussed as a means of preventive medicine. Support for the mandatory use of seat belts is offered. Emphasis is placed on the negligence of crash protection for infants and children and the injury and fatality rates especially in children under 14. The hazards of using standard seat belts on small children are described, as well as the indifference of parents, industry, and government to child safety in vehicles. It is suggested that legislative provisions for child transportation safety should be all-inclusive, and that taxis, limousines, and commercial vehicles should have safety belts in all seated positions and readily available for passenger usage. Public education is also advocated.

by S. Charles  
Physicians for Automotive Safety, Newark, N. J.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C. 1973  
p69-73  
1973  
Availability: Bound in HS-015 558

HS-015 571

#### **PANEL DISCUSSION--PHYSICIANS VIEW SAFETY BELT USE**

Injuries resulting from non-use of seat belts are described from the viewpoint of a hospital emergency room physician, and mandatory usage laws are advocated. Questions and answers are given relating to child safety restraint systems, the Australian seat belt law, parental responsibilities in child safety, shoulder harness injuries, school bus safety, small child safety using standard seat belts, and legislation needs.

by J. D. Mills  
American Coll. of Emergency Physicians  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p74-9  
1973 ; 2refs  
Availability: Bound in HS-015 558

HS-015 572

#### **GETTING THE SAFETY BELT FACTS BEFORE THE LEGISLATORS**

Efforts of the National Safety Council to promote seat belt usage are described. Benefits of seat belts are discussed briefly along with the impact of public information and advertising campaigns. The interrelationships between voluntary and governmental action in connection with safety belts are considered, along with the impact in Australia of the seat belt legislation. It is concluded that every public information and public education channel possible must be utilized to make the public and the state legislatures know how vitally important seat belt laws are.

by V. Tofany  
National Safety Council, Chicago, Ill.  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p82-5  
1973  
Availability: Bound in HS-015 558

HS-015 573

#### **FEDERAL INCENTIVES FOR SAFETY BELT LAWS**

Incentive grants to be awarded to states for compliance with highway safety programs are described and seat belt usage laws are advocated. It is suggested that the incentive grants provide the missing link in the campaign to get the states to adopt safety belt use legislation. Statistics are cited which forecast the reductions in injuries and fatalities and the financial benefits to the states.

by W. H. Harsha  
Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973  
p86-9  
1973  
Availability: Bound in HS-015 558



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HSL 75-4

HS-015 574

#### ACHIEVING SAFETY BELT USE LEGISLATION

Workshop reports for promoting safety belt use legislation are described which focus on assessments of public opinion, private sector and private interest group support, lobbying efforts, support from medical and automotive specialists, and commitment by state governors. Problems to be expected in the process of developing the legislation are outlined as well.

by E. L. Peters, Jr.

North Carolina Governor's Hwy. Safety Prog.

Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973

p90-1

1973

Availability: Bound in HS-015 558

HS-015 575

#### IMPLEMENTING THE LAW

Workshop reports on implementation of seat belt usage laws are summarized. Emphasis is on enforcement procedures and commitment, public education efforts, continuing publicity on belt effectiveness, "before and after" data dissemination, insurance credits for belt wearers during an accident, design improvements, and rescinding of the safety belt interlock system provisions of the law when a desirable compliance level is achieved.

by W. Hoaglund

Minnesota Dept. of Public Safety, St. Paul

Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973

p92-3

1973

Availability: Bound in HS-015 558

HS-015 576

#### EVALUATING THE EFFECTIVENESS OF SAFETY BELT USE LAWS

Statistics and charts are presented which indicate the effectiveness of safety belts in a workshop report of mandatory usage legislation. Data are given on: the effectiveness of warning or reminder systems in increasing belt usage, comparing vehicles with light-and-buzzer systems to those without; measured usage in rental cars; vehicle occupants killed; safety belt rate use by trip distance and use related to city size and to job and education. It is emphasized the federal role should be one of providing guidance and assistance in the development and the execution of evaluation programs as requested by the states.

by P. R. Knaff

National Hwy. Traf. Safety Administration, Washington, D. C.

Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973

p94-103

1973

Availability: Bound in HS-015 558

HS-015 577

#### GENERAL DISCUSSION FOLLOWING WORKSHOP REPORTS

Questions and answers regarding workshop reports on seat belt usage laws are presented which focus on several topics, including: injury and fatality reduction statistics; terminology in the legislation to prevent excessive public opposition; and data acquisition. The conference participants formally voted to support seat belt usage legislation.

Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973

p104-7

1973

Availability: Bound in HS-015 558

HS-015 578

#### THE FUTURE IS NOW

The future of seat belt usage is discussed and the major obstacle to overcome is cited as the education of the public as to seat belt effectiveness. Increased vehicle usage is seen and the cooperative efforts of industry and government in promoting automotive safety through technology and legislation are advocated. The Australian precedent in reducing traffic injuries and fatalities is noted. Public opinion is stressed as the most important factor in encouraging use and law passage.

by B. Davis

Department of Transp., Washington, D. C.

Publ: HS-015 558, NATIONAL SAFETY BELT USAGE  
CONFERENCE PROCEEDINGS, Washington, D. C., 1973

p108-12

1973

Availability: Bound in HS-015 558

HS-015 579

#### AIR BAGS: THE PRESSURE IS ON

The air bag controversy is examined with cases cited of actual collision experiences. DOT's proposed amendment to Safety Standard 208 regarding air bag requirements in vehicles manufactured after September 1976 is given with industry reactions discussed. Spokesmen are quoted who feel that the standard proposal is unreasonable and does not meet safety requirements, as well as being too costly. It is noted that the air bag's biggest drawback is its inability to keep the seat beltless occupants inside from being thrown around, and that the bag does not deploy in rear and side impacts or in rollover accidents. Theories are offered for ways to increase seat belt usage, including mandatory belt laws, which would seem to negate the need for passive restraints.

by F. M. H. Gregory

Publ: MOTOR TREND v25 n10 p96-9 (Oct 1974)

1974

Availability: See publication



HS-015 580

**TRAFFIC ACCIDENT FACTS 1973. CITY OF PHILADELPHIA**

Details of traffic accidents in Philadelphia in 1973 are offered on: accident record analysis; driver involvement and fatality rate; deaths and injuries; economic loss; 1972 comparison; pedestrian record; driver characteristics; physical hazards; traffic safety indoctrination; and accident prevention activities, including traffic engineering, enforcement and safety education. Statistical charts and graphs are presented with data on: accident types; monthly summaries; time, sex, and age factors; road hazards; residence of drivers; accident location; principle violations; vehicle movement analysis; vehicle types; light conditions; vehicle registrations; and trends, 1949-1973.

Philadelphia Dept. of Streets, Pa.

1973 ; 39p

Availability: City of Philadelphia, Dept. of Streets, Traf. Engineering, 900 Municipal Services Bldg., Reynburn Plaza, Philadelphia, Pa. 19107

HS-015 581

**TRUCK NOISE--6 B. A BASELINE STUDY OF THE PARAMETERS AFFECTING DIESEL ENGINE INTAKE AND EXHAUST SILENCER DESIGN. FINAL REPORT**

A survey of diesel engine, truck, intake system, and exhaust system manufacturers was made for the purpose of compiling detailing information on all major mass-produced diesel engines currently used in the United States for trucks and buses, and on existing or available-for-order diesel engine intake and exhaust silencers. This survey was conducted by written questionnaire. Survey information was supplemented with comparative data on the acoustic characteristics of diesel engines and the acoustic performance of selected intake and exhaust systems. These data were obtained through engine dynamometer and vehicle drive-by tests. All survey and test information was compiled and presented in tabular form by engine model to allow data comparison and silencer system selection.

by T. Donnelly; J. Tokar; W. Wagner  
Donaldson Co., Inc., Minneapolis, Minn.  
Contract DOT-TSC-532

Rept. No. DOT-TSC-OST-73-38 ; 1974 ; 232p

Rept. for 29 Sep 1972 - 31 Jan 1973.

Availability: NTIS

HS-015 582

**PROSPECTS FOR VARIABLE GEOMETRY COMPRESSORS IN AUTOMOTIVE GAS TURBINES**

The variable geometry compressor cycle is found to offer the potential of a less complex and less expensive alternative to the variable geometry turbine or power transfer. However, the limitations imposed on its design point turbine inlet temperature preclude it from being competitive, on a performance basis, with present engines utilizing these hot end solutions at state-of-the-art turbine inlet temperature values. As maximum cycle temperatures increase to improve performance, the design point turbine inlet temperature of the variable geometry compressor cycle can also increase, so the variable geometry

compressor cycle performance shows considerable potential for improvement as turbine inlet temperatures go up. It is noted that the increasing temperature trend tends to worsen the problems associated with hot end systems such as power transfer and variable geometry turbines. The future of the variable geometry compressor may be bright.

by G. M. Shulhan

Publ: QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT n2 p15-24 (1974)

Rept. No. DME/NAE-1974 (2) ; 1974 ; 4refs

Based on Master's thesis, Carleton Univ., Ottawa.

Availability: See publication

HS-015 583

**THERMAL ANALYSIS IN THE AUTOMOTIVE FIELD**

The use of thermal analysis (TA) for analyzing raw materials, particularly in the area of polymers, is examined. Three TA techniques most widely used are described: differential scanning calorimetry, thermogravimetric analysis, and thermomechanical analysis. Procedures and applications of each are discussed. It is noted that a brief summary cannot do justice to present and future utilization of thermal analysis methods as a powerful quality control tool, and it is concluded that TA can effectively predict and eliminate potential failures in a field such as the automotive industry which is sensitive to costs, both in dollars and in public image.

by P. F. Levy

Publ: QUALITY MANAGEMENT AND ENGINEERING  
v13 n9 p26-9 (Sep 1974)

1974 ; 7refs

Availability: See publication

HS-015 584

**VALUE AND DEFICIENCIES OF STUDIES ON BAC'S AMONG DEAD AND INJURED**

The mortality and morbidity from road accidents is increasing in almost all technically developed countries, the increase being greatest in the case of drivers of motor vehicles. An epidemiological approach to the problem, which attempts to identify the human and environmental variables influencing risk of accident involvement, must take account of the effects of drugs, including alcohol, on the ability to drive safely. Studies of the blood alcohol concentration of drivers killed and injured in road accidents provide important evidence in this respect, particularly when related properly to the blood alcohol concentration found in drivers not involved in road accidents.

by J. D. J. Havard

British Medical Assoc., London (England)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS, p1-16 1973

1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 585

HS-015 585

**ROADSIDE SURVEYS OF DRINKING-DRIVING BEHAVIOUR**

Fourteen roadside surveys in six countries employing a variety of techniques within equally varied experimental designs are summarized. A meeting in Canada is discussed in which delegates from six countries agreed that it is feasible and possible to conduct roadside surveys on an internationally comparable basis. Patterns from some completed studies are shown in chart and graph form.

by C. M. Stroh  
Canada Ministry of Transport, Ottawa, Ont. Road and Motor Vehicle Traf. Safety Office

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS, 1973 p17-43

1973 ; 12refs

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 586

**COLLECTION OF BASELINE DATA ON EFFECT OF ALCOHOL CONSUMPTION ON TRAFFIC ACCIDENTS**

The problems of countermeasures as applied to problem drinkers are considered and the evaluation of countermeasures is discussed. No sacrifice of the basis for evaluation to the pressures for action is urged. It is concluded that if the fundamental criteria in the experimental designs are not preserved, there will be no way of providing answers for the actual outcome, whether an increase, a decrease, or no change in number of alcohol-crash fatalities.

by M. W. Perrine  
Vermont Univ., Burlington

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS, 1973 p44-8

1973 ; 9refs

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 587

**COLLECTION OF BASELINE DATA ON EFFECT OF ALCOHOL CONSUMPTION ON TRAFFIC ACCIDENTS**

Reports on a study of blood alcohol levels and drugs in a hospital emergency room are presented. A total of 40% of the emergency room patients were on alcohol or medications at the time they are seen: 25% had a blood alcohol level above 0.15%, 11% were on a sedative, and 8% were taking salicylates. Various tables compare age, sex, occupation, drinking habits, etc.

by J. A. L. Gilbert  
Alberta Univ., Edmonton (Canada); Royal Alexandra Hosp., Edmonton, Alta. (Canada)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,

HSL 75-4

INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS, 1973, p49-54  
1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 588

**REVIEW AND EVALUATION OF LEGISLATIVE AND ENFORCEMENT PROGRAMS RELATED TO THE USE OF ALCOHOL AND OTHER DRUGS**

Various legislative and enforcement programs designed to curb impaired driving are reviewed and evaluated. These are classified into three groups, as laws making it an offense to have care or control of a motor vehicle: while impaired by alcohol or drugs, where impairment is judged solely by observation or clinical examination; while impaired by alcohol, where impairment is defined by blood alcohol content of .08%, .10%, or .15% and determined by chemical test of blood, breath, or urine; and when a driver's blood alcohol content is more than a specified limit as determined by chemical test of blood, breath, or urine, with refusal to undergo a chemical test carrying the same penalty as conviction. Three changes in the law are suggested: roadside screening test usage, compulsory treatment of problem drinkers and driving-while-intoxicated repeaters, and chemical tests of blood and urine as well as breath samples. Tables show accident involvement by blood alcohol concentrations. Graphs give probability of accident and involvement in single and multiple vehicle accidents.

by P. J. Farmer  
Canada Safety Council, Ottawa, Ont.

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS, 1973 p55-69

1973 ; 20refs

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 589

**POLY(AMIDE-IMIDE) POLYMERS--PROPERTIES, PROCESSING TECHNIQUES, AND BEARING PERFORMANCE**

The properties offered by poly(amide-imide) molding resins allow design engineers to consider plastics for applications formerly considered too severe for polymers, and allow plastics to penetrate markets for fluid valves, bearings, gears, and other functional parts which, until this time, have primarily been the province of metals. In addition, these resins can offer a practical substitute for other plastics which must be replaced as the conditions under which they must perform exceed their inherent capabilities.

by R. H. Walker  
Amoco Chemicals Corp., Chicago, Ill.

Rept. No. SAE-740291 ; 1974 ; 6p

Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.

Availability: SAE

April 30, 1975

HS-015 595

HS-015 590

### **COUNTERMEASURES AGAINST DRINKING DRIVERS**

The differences that the new Canadian law has brought to drinking driver arrest statistics are reviewed, and consideration is also given to the effectiveness of roadblocks, two faults in the Canadian law, and the need for education for police, lawyers, and judges.

by D. M. Lucas

Ontario. Dept. of Justice, Toronto (Canada)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p100-2 (Feb 1973)  
1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 591

### **COUNTERMEASURES AGAINST DRINKING DRIVERS**

DWI Phoenix, a corrective course for persons convicted of driving while under the influence of alcohol, is described. The pre-ASAP program is covered fully including background, evaluation, records, adjunct counseling services, and attitudes, and is compared briefly with the post-Alcohol Safety Action Project period for which effectiveness data was not available. Resolving the problem of adequate counseling help to alcoholics and others with severe emotional problems should receive high priority in DOT's ASAP programs, even if only for a more fair test of the effectiveness of countermeasures which may in themselves provide motivation for change but be without the resources to see it through.

by J. L. Malfetti

Columbia Univ., New York

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p103-6 (Feb 1973)  
1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 592

### **INTERACTION OF ALCOHOL AND DRUGS AND TRAFFIC SAFETY**

The study of the involvement of alcohol and of drugs in traffic safety and traffic injuries from an epidemiological point of view, with regard to the emergence of traffic injuries, not only shows the importance of alcohol intake, and of alcoholism and the rising role of the interaction between alcohol and drugs, but also serves to disclose some of the underlying mechanisms in the intricate pattern of different social events and their interaction with other social phenomena and with the direct interplay between the drugs and the individual.

by L. Goldberg

Karolinska Inst., Stockholm (Sweden)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,

INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p107-30 (Feb 1973)

1973 ; 48refs

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 593

### **INTERACTION BETWEEN ALCOHOL AND DRUGS, AND THEIR RELATIONSHIP TO DRIVING**

After a short review of other work, tests on the effects on driving of cannabis alone and in combination with alcohol are described. Alcohol had little effect on performance, low doses of cannabis had a varied effect according to subject, while high doses had a marked effect on reaction time, acquisition time, and settling time. Combination of alcohol and cannabis resulted in much worse performance times than with either agent alone.

by G. M. Ling

Ottawa Univ., Ont. (Canada)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p131-5 (Feb 1973)

1973 ; 26refs

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 594

### **RESEARCH RESULTS ON DRIVERS BLOOD ALCOHOL LEVELS IN FRANCE (QUELQUES RESULTATS DE RECHERCHES MENEES EN FRANCE A PROPOS DE L'IMPREGNATION ETHYLIQUE DES CONDUCTEURS)**

The new French law (July 9, 1970) determining thresholds for blood alcohol content and allowing breath tests is described. The legislation did not modify the behavior of people exhibiting over 0.80g% blood alcohol. Various explanations for lack of change are proposed, and an outline of policy of information for the public is given.

by J. L'Hoste

Organisme National de Securite Routiere, Paris (France)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p136-52 (Feb 1973)

1973

Conference held in Montreal, 30-31 May 1972. Text also in French.

Availability: See publication

HS-015 595

### **EXPERIENCE EN FRANCE CONCERNANT DES CHAUFFEURS SOUS L'INFLUENCE DE L'ALCOOL ET DES DROGUES (EXPERIENCE IN FRANCE CONCERNING DRIVERS UNDER THE INFLUENCE OF ALCOHOL AND DRUGS)**

An opinion survey taken after the new French laws on drinking and driving were passed is discussed. Two-thirds of the respondents thought the alcohol amounts allowed were far too

HS-015 596

low. After having consumed alcohol sufficient to raise the level to 0.80 (sic) blood alcohol concentration, 35% waited an insufficient time before driving. The same percentage (66%) felt they themselves were never concerned with the law. The law could not be enforced, according to more men than women. Many did not believe that alcohol increases driving risks.

by M. Monseur

Organisme National de Securite Routiere, Paris (France)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p153-5 (Feb 1973)

1973  
Conference held in Montreal, 30-31 May 1972. Text in French.  
Availability: See publication

HS-015 596

**PANEL DISCUSSION ON RESEARCH PRIORITIES IN CONTROLLING EFFECT OF ALCOHOL AND DRUGS ON DRIVER BEHAVIOUR**

Panel and floor discussions are reported on carbon monoxide and cigarette smoking effects on driving, the effects of drugs on intoxication and the nervous system, drugs and driving, French drinking habits, problems of detecting hashish or LSD.

by A. F. W. Peart; L. Goldberg; J. D. J. Havard; J. L'Hoste; R. B. Voas; C. M. Stroh; P. J. Farmer

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p156-61 (Feb 1973)

1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 597

**THE PLACE OF PSYCHOLOGICAL RESEARCH IN DRIVER BEHAVIOUR**

About two-thirds of all accidents are shown to result from mismatches between the driver's decision making behavior and the demands imposed on him by the traffic system. Psychological research on these mismatches is seen to be the greatest potential source of remedial measures in accident reduction and prevention. Research priorities are discussed in relation to the alternative remedial measures of driver selection and training, and improvements to the hardware and software of the traffic system.

by I. D. Brown

Medical Res. Council, Cambridge (England)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p162-72 (Feb 1973)

1973 ; 28refs  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HSL 75-4

HS-015 598

**THE ROLE OF HUMAN ENGINEERING IN ACCIDENT PREVENTION RESEARCH-- DRIVER/VEHICLE INTERACTION**

The role of human factors engineering in accident prevention, as opposed to its role in injury reduction or postcrash measures, is discussed. Emphasis is placed on vehicle factors that can be human engineered to help prevent accidents. The purpose of human factors research is outlined along with methods of accident analysis. Specific priorities in the area of driver/vehicle interaction are seen as driver visibility requirements, vehicle lighting and controls/displays and controllability. Past, present, and proposed future activities in these areas are examined. Diagrams and charts are included.

by P. R. Knaff

National Hwy. Traf. Safety Administration, Washington, D. C.

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p173-89 (Feb 1973)

1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 599

**PROBLEMS OF USING PLASTICS IN THE CAR INDUSTRY**

The necessity of careful testing in the design of plastic parts for automobiles is discussed. Specific details are given on tests on polypropylene plastic parts, such as radiator grills, tool-boxes, and fans. Microtome photographs show details of good and poor connections of varied plastics when they are welded. Different types of plastic are considered.

by R. Fernengel

Bayerische Motoren Werke A.G., Munich (West Germany)

Rept. No. SAE-740290 ; 1974 ; 9p

Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.

Availability: SAE

HS-015 600

**THE PLACE OF PSYCHOLOGICAL RESEARCH IN DRIVER BEHAVIOUR**

Parts of preceding papers on the role of psychological research in driver behavior are reviewed, and comments are offered based on personal experience. Consideration is given to driver simulators, accident prone drivers, driver records, near accidents, auditory perception, retractable windshield wipers, and signing.

by C. H. Baker

Defence Res. Board of Canada

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p202-4 (Feb 1973)

1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

April 30, 1975

HS-015 606

HS-015 601

# **THE PLACE OF PSYCHOLOGICAL RESEARCH IN DRIVER BEHAVIOUR**

Agreement is offered with Brown's priorities in psychological research in driver behavior. These include identifying the high driver work load areas, research into driver training, retraining, attitudes to training, and the identification of skill deficiencies and their corrective measures or proposed corrective measures for accident repeaters.

by I. H. Anderson

Canada Dept. of National Health and Welfare, Ottawa, Ont.

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p205-6 (Feb 1973)

1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 602

# **SYMPOSIUM ON CAR CRASH INVESTIGATIONS AND THEIR USEFULNESS--MEDICAL POINT OF VIEW**

A review is offered of what reliable information can be obtained for the medical community in all three phases of the crash. In the precrash phase, data on alcohol and/or drug usage can be obtained along with psychological studies and driver familiarity with the vehicle. Within the crash phase, environmental factors can be considered, including sign effectiveness, road markings, unprotected bridge piers, and roadside drainage ditches. Injury investigation and analysis as to cause must also be examined. Field accident investigation can help determine the effects of vehicle design modification, and laboratory studies are needed for human tolerance data. In the postcrash phase, problems center on the emergency medical care factor.

by D. F. Huelke

Michigan Univ., Ann Arbor

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p207-8 (Feb 1973)

1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 603

# **SYMPOSIUM ON CAR CRASH INVESTIGATIONS AND THEIR USEFULNESS--MANUFACTURER'S POINT OF VIEW**

National Safety Council 1970 statistics showing a drop of 1200 traffic fatalities (2000 among passenger car occupants) are reviewed. Some questions are posed, and the improved medical care and improved occupant protection are examined. It is suggested that data are needed on the relative frequencies of injuries and deaths in cars of different weight classes within

each model year. Case data from multidisciplinary teams are included.

by R. C. Haeusler

Chrysler Corp., Detroit, Mich.

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p209-12 (Feb 1973)

1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 604

# **SYMPOSIUM ON CAR CRASH INVESTIGATION AND THEIR USEFULNESS**

Symposium topics include injury scaling, how investigation helps determine FMVSS effectiveness, and information from reports of side impact accidents and motorcycle accidents.

by J. D. States

Rochester Univ., N.Y. School of Medicine

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p213-6 (Feb 1973)

1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 605

# **SYMPOSIUM ON CAR CRASH INVESTIGATIONS AND THEIR USEFULNESS**

Future needs in accident research are examined. It is suggested that emergency medical services require notification services, general first aid training, trained ambulance personnel, and multidisciplinary emergency physicians. An epidemiological approach to accidents is urged along with proper driver training.

by W. R. Ghent

Queen's Univ., Kingston, Ont. (Canada)

Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS p217-20 (Feb 1973)

1973

Conference held in Montreal, 30-31 May 1972.

Availability: See publication

HS-015 606

# **SYMPOSIUM ON CAR CRASH INVESTIGATIONS AND THEIR USEFULNESS**

The establishment of some Canadian university-based centers for interdisciplinary accident research and pollution control research is advocated. The effectiveness of the team approach to these types of problems is noted, with reference made to the University of Michigan and University of Birmingham studies. Education of the public is suggested as an ultimate goal of detailed collision investigation and pollution research. The

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need for finding and training young people in these fields is stressed.

by A. L. Thompson  
McGill Univ., Montreal, Que. (Canada)  
Publ: CONFERENCE ON MEDICAL, HUMAN AND  
RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,  
INCLUDING ALCOHOL AND OTHER DRUGS,  
PROCEEDINGS p221-2 (Feb 1973)  
1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 607

#### **SYMPOSIUM ON CAR CRASH INVESTIGATIONS AND THEIR USEFULNESS. GENERAL DISCUSSION**

The need for advertising traffic safety is stressed, particularly for seat belt usage by pregnant women and children. Questions and answers follow on deactivation of seat belt buzzers and the need for usage laws.

by D. F. Huelke; J. L. Weygandt; R. C. Haeusler; J. Moon  
Publ: CONFERENCE ON MEDICAL, HUMAN AND  
RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,  
INCLUDING ALCOHOL AND OTHER DRUGS,  
PROCEEDINGS p223-5 (Feb 1973)  
1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 608

#### **MEDICAL CONDITIONS (PHYSICAL) AFFECTING DRIVER BEHAVIOR**

The action of the Traffic and Safety Committee of the British Columbia Medical Association as the Medical Advisory Board to the provincial Superintendent of Motor Vehicles is described, including such activities as procedures for driver medical examination. Medical factors discussed include: vision, cardiovascular disease, angina pectoris, myocardial infarction, hypertension, cardiac pacemakers, prosthetic valves, cerebrovascular disease, peripheral vascular disease (arterial aneurysms), epilepsy, mental deficiency, psychiatric disease, drug effects, and aging. Research is advocated in several of these areas.

by P. M. Ransford  
Canada Safety Council, Ottawa, Ont.; British Columbia  
Medical Assoc., Victoria (Canada)  
Publ: CONFERENCE ON MEDICAL, HUMAN AND  
RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,  
INCLUDING ALCOHOL AND OTHER DRUGS,  
PROCEEDINGS p226-9 (Feb 1973)  
1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 609

#### **THE ROLE OF LIFE EVENTS AND SUBJECTIVE STRESS IN ACCIDENT CAUSATION**

Several research studies correlating traffic accidents with the personality and behavior traits of drivers are reviewed. A possible hypothesis for accident causation is advanced as a

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result of studies indicating that life changes such as personal crises, divorce, job change, or residence change usually precede significant illness. It is likely that they also will be found significant in traffic accidents where their impact on the mental state of the driver must directly affect driver behavior.

by M. L. Selzer; A. Vinokur  
Michigan Univ., Ann Arbor  
Publ: CONFERENCE ON MEDICAL, HUMAN AND  
RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,  
INCLUDING ALCOHOL AND OTHER DRUGS,  
PROCEEDINGS p230-46 (Feb 1973)  
1973 ; 31refs  
Conference held in Montreal, 30-31 May 1972. Project was  
sponsored by the National Hwy. Traf. Safety Administration  
and the U. S. Dept. of Transp.  
Availability: See publication

HS-015 610

#### **MEDICAL CONDITIONS AFFECTING DRIVER BEHAVIOR**

Preceding papers are reviewed and three priorities for Canadian research into the medical causes of traffic accidents are listed. These include: definition by retrospective studies of the physical, behavioral, and life event changes which might cause the driver or the pedestrian to be involved in a traffic accident; use of the results of the retrospective study as a basis for development of a prospective study which would take a sample population, measure their physical, psycho-social-economic, and behavioral characteristics and relate them to life event changes to determine how many of these people ultimately get into an accident; and mobilization of public opinion and medical-health-government resources to implement defined solutions which eliminate the factors which cause motor vehicle accidents.

by J. R. Mackenzie  
McMaster Univ., Hamilton, Ont. (Canada)  
Publ: CONFERENCE ON MEDICAL, HUMAN AND  
RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,  
INCLUDING ALCOHOL AND OTHER DRUGS,  
PROCEEDINGS p247-9 (Feb 1973)  
1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 611

#### **MEDICAL CONDITIONS AFFECTING DRIVER BEHAVIOR. GENERAL DISCUSSION**

Brief exchanges are presented concerning accident causes in Israel, techniques of driver selection in relation to medical conditions, and personnel authorized to conduct medical examinations.

by J. A. Waller; J. D. J. Havard; G. Gingras  
Publ: CONFERENCE ON MEDICAL, HUMAN AND  
RELATED FACTORS CAUSING TRAFFIC ACCIDENTS,  
INCLUDING ALCOHOL AND OTHER DRUGS,  
PROCEEDINGS p250-1 (Feb 1973)  
1973  
Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

April 30, 1975

HS-015 616

HS-015 612

**RESEARCH PRIORITIES INTO FACTORS CAUSING TRAFFIC ACCIDENTS. (SUMMARY OF CONFERENCE)**

Important concepts presented at the conference are summarized, and needed research is outlined under four system approaches: injury as an unwanted end result, interaction of control mechanisms, the human himself, and the transportation system. Priorities for research are discussed, including behavioral countermeasures for drinking drivers, alcohol usage by young drivers, public education campaigns, drug identification and quantification, hangovers, and pedestrian safety.

by J. A. Waller  
Vermont Univ., Burlington. Dept. of Community Medicine  
Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS P252-7 (FEB 1973)  
1973

Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 613

**CONCLUDING COMMENTS AND DISCUSSION**

The effectiveness of public campaigns is evaluated along with the number of lives that can be saved with better emergency care, relationship of criminal history to accidents, pedestrian injuries and fatalities, effectiveness of child safety education and of laws on drinking and driving, modeling as an operational information channel, and research priorities.

by R. Prevost; J. Waller; J. Havard; C. Stroh; L. Goldberg; D. S. Kochhar; R. Voas  
Publ: CONFERENCE ON MEDICAL, HUMAN AND RELATED FACTORS CAUSING TRAFFIC ACCIDENTS, INCLUDING ALCOHOL AND OTHER DRUGS, PROCEEDINGS P258-63 (FEB 1973)  
1973

Conference held in Montreal, 30-31 May 1972.  
Availability: See publication

HS-015 614

**1972 TRAFFIC ACCIDENTS AND ACCIDENT RATES ON THE STATE HIGHWAY SYSTEM**

Accident rates in Oregon are compared in a four-part report. Part 1 shows how the state traffic death rate compares with the nationwide rate and also gives comparative rates by design types. The second part presents the accident experience for each highway in total as well as for short sections. Part 3 lists the Urban and Rural Intersection Accidents on the state highway system, with the severity of the total accidents at each intersection indicated by persons killed and injured, grouped by city and rural section. The fourth part contains a listing of the statewide fatal accidents in 1972, divided into urban and rural areas, with the rural areas subdivided between state highways and county roads. The scheme provides for ex-

pressing collision frequencies in relation to traffic volume and lineal length.

by G. L. Jackson; A. Yturri; T. B. Bruno  
Oregon. State Hwy. Commission, Salem  
Rept. No. Pub-73-2 ; 1973 ; 417p  
Prepared in cooperation with the Federal Hwy. Administration.  
Availability: Oregon State Highway Commission, Salem

HS-015 615

**STUDED TIRE PAVEMENT WEAR REDUCTION AND REPAIR. PHASE 1**

Pavement tests were conducted to determine pavement wear caused by studded tires, to evaluate the resistance of different pavement materials and textures used in Washington and Idaho to wear caused by tire studs, to test pavement materials and overlays to reduce tire stud damage, and to study the effect of studded truck tires on pavements. Three studded types and unstudded passenger tires, three studded and unstudded truck tires, and 46 sections of various types of pavement materials, surface overlays and surface textures were tested. The results are based on wear in terms of rate of wear, area removed, maximum and average rut depth using the Washington State University Profilometer, and the camera wire shadow apparatus, and are valid only under WSU testing conditions. The findings indicate that some pavement materials are more resistant to the effect of studded tires than others. All types of studded tires tested caused some pavement wear and this affected the skid resistance values. The new types of studs reduced wear of various pavement materials. Studded truck tire wear was less than expected due to equipment problems.

by M. Krukar; J. C. Cook  
Washington State Univ., Pullman. Transp. Systems Section  
Rept. No. TSS-Pub-H-39; WSHDRP-9.1 ; 1972 ; 179p 42refs  
Prepared for the Washington State Hwy. Commission, Dept. of Hwys. in cooperation with the Federal Hwy. Administration and the Idaho Dept. of Hwys. Rept. from 3 Sep 1971-30 Jun 1972.  
Availability: Washington State Hwy. Commission, Dept. of Hwys., Hwy. Administration Bldg., Olympia, Wash. 99163

HS-015 616

**BRAKE BALANCE AND 121**

Some misconceptions about FNVSS 121 are clarified and procedures for achieving a completely balanced brake system are described. It is noted that: any vehicle built on or after September 1, 1974 must comply with FMVSS 121 regardless of the date the equipment was ordered; anti-lock-up controls are not specified but 121 requirements would be difficult to meet without an anti lock-up system; characteristics and performance of brake linings are not specified; manufacturers are completely responsible for performance of the brake system in compliance with FMVSS requirements; correct brake balance is imperative in order to achieve maximum brake performance, lining life, and drum life. Conditions are outlined for mechanical balance, pneumatic balance, air transmission time, and



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friction balance. Coding on the block is also discussed in relation to coefficient of friction.

by W. Tauss  
Publ: DIESEL EQUIPMENT SUPERINTENDENT p30-2  
(Mar 1974)  
1974

Availability: See publication

HS-015 617

#### TESTS SUPPORT ATA'S 121 PETITION

As a result of the East Liberty, Ohio, test demonstration, the American Trucking Association contends that FMVSS 121 anti-lock provisions should become effective as scheduled, and that potentially hazardous front axle braking requirements should be scaled down. Petition is made for several modifications in FMVSS 121, including: front axle brakes with a torque output requirement based solely on static rated roads; anti-lock all around; a front axle limiting valve in the cab to permit a 50% reduction in front axle brake torque on slippery roads; relaxation of tractor brake pressure build-up to 60 psi; a driver foot controlled secondary braking system with standardized in-cab air brake system controls; and deletion of spring or parking brakes on converter dollies.

by Anonymous  
Publ: DIESEL EQUIPMENT SUPERINTENDENT p30-2  
(Feb 1974)  
1974

Availability: See publication

HS-015 618

#### COMMERCIAL TRAFFIC STUDIES

Several traffic counts were made to provide data for the revision of Road Note 29, 3rd Edition. In these counts the traffic was counted separately for each traffic lane with the commercial traffic sub-divided by axle and wheel arrangement and with their body types classified as either Public Service Vehicle, Rigid, Articulated, or Trailer. Data were also obtained on the axle weights of particular types of commercial vehicles at three sites, at one of which the observations were repeated after a nine month interval. These data provide useful information on the axle and gross vehicle loading of particular types of commercial vehicles and the percentage of overweight axles and vehicles. The observations were carried out initially to provide data for internal use, but a number of sources have drawn on a combination of the traffic count and axle weight data, to provide information on the wider aspects of commercial traffic. Accordingly a summary of the available data is reproduced.

by E. W. H. Curren  
Transport and Road Res. Lab., Crowthorne, Berks. (England)  
Rept. No. TRRL-LR-628 ; 1974 ; 92p 10refs  
Availability: Pavement Design Div., Structures Dept.,  
Transport and Road Res. Lab., Crowthorne, Berks., England

HSL 75-4

HS-015 620

#### SEAT BELTS: FACTORS INFLUENCING THEIR USE. A LITERATURE SURVEY. PT. 2: CONDENSED REPORTS

Condensed synopses of seat belt studies reported in 1960 or later from England, Finland, Sweden, and the U.S. are presented. Papers are divided into four categories: those dealing with general background and opinions; studies on demographical and other background variables; the relation between seat belt use and attitudinal and personality factors; and the effects of seat belt promotional campaigns and experimental manipulations of variables upon seat belt use or indicators of use.

by G. Phaner; M. Hane  
Statens Trafiksakerhetsverk, Solna (Sweden)  
Rept. No. 19; Dnr-93-712431-u ; 1971 ; 91p 42refs  
Pt. 1 is HS-013 293.

Availability: The Swedish Road Safety Office, Driver Licence and Res. Dept., Fack, S-171 20 Solna, Sweden

HS-015 621

#### SEAT BELTS: CONTEXTUAL FACTORS AND BIAS OF REPORTED USE. AN EXPERIMENTAL STUDY

It was hypothesized that if the observed discrepancy between reported and observed seat belt usage was due to a social desirability response set, the discrepancy should be reduced if the respondents were told that their belt use had been observed. This observation factor was investigated together with survey sponsorship and interviewer sex in a study using 2x3x2 factorial design. A total of 257 drivers who had been observed in running traffic were randomized into twelve groups and were subjected to a telephone interview concerning their belt use habits and opinion on a belt use law. The interviewer, male for one half of the groups and female for the other half, introduced him/herself as working with either the National Road Safety Office or a university department, or as a student in a traffic education class. Half of the subjects were told that they had been observed when driving and that the focus on interest was on the method of observation. Two parallel methods of analysis of variance were performed on the total sample and on the subsample having a pro-belt attitude as indicated by a favorable opinion on a belt usage law. It was concluded that the three factors had no effects on reported use or on opinion on a usage law. It was tentatively suggested that a social desirability response set was not very important for reports on usage or attitude.

by G. Phaner; M. Hane  
Statens Trafiksakerhetsverk, Solna (Sweden)  
Rept. No. 23; Dnr-93-724284-u ; 1972 ; 47p 17refs  
Sponsored by "The Safety Pin" traffic safety fund, AB Svenska Renault.  
Availability: The National Swedish Road Safety Office, Driver Licence and Res. Dept., Fack, S-171 20 Solna, Sweden

HS-015 622

#### SEAT BELTS: RELATIONS BETWEEN BELIEFS, ATTITUDE, AND USE

On the basis of a model of attitude to seat belt use a questionnaire was constructed tapping beliefs that seemed relevant for seat belt usage. A sample of car owners was drawn from the



vehicle register and 368 answered the mailed questionnaire as well as the follow-up enquiry by telephone concerning their belt use habits. A factor analysis yielded a belief pattern that was interpreted in terms of five factors, labeled discomfort, worry, risk, effect, and inconvenience. The model appeared useful since an independent measure of the attitude (Ao) could well be predicted from a linear combination of individual factor scores. Two factors, discomfort and effect, yielded near optimal predictions. The correlation between Ao and reported use was .555, or about the same as the multiple correlation between the belief factors and reported use. The discomfort-effect combination also gave near optimal predictions. The generality of the belief pattern was demonstrated by a validation study of a sample (N equals 105) for which a series of at least five observations was obtained. On the basis of the obtained relationships, a model of seat belt use was suggested, in which conceptions about discomfort of belt usage and of effects of belts in an accident were regarded as determinants of usage.

by G. Phaner; M. Hane 05Statens Trafiksakerhetsverk, Solna (Sweden)  
Rept. No. 25; Dnr-93-732109-u ; 1973 ; 94p 31refs  
Sponsored by "The Safety Pin" traffic safety fund, AB Svenska RENAULT.  
Availability: The Swedish Road Safety Office, Driver Licence and Res. Dept., Fack, S-171 20 Solna, Sweden

HS-015 623

#### SEAT BELTS: CHANGING USAGE BY CHANGING BELIEFS

Seat belt information was designed on the basis of a model of seat belt use, where a linear combination of beliefs about discomfort (D) when wearing a belt, and beliefs about injury reducing effects (E) of belts were regarded as determinants of disposition toward belt use. Workers and employees of a large steel company having been observed as consistent non-users (N equals 85) had more favorable post test beliefs than the control groups. The belief effects were paralleled by behavior effects. The strongest effects were obtained for the unpretested belt information group where almost 45% of the Ss were observed as users; i.e., had a belt on at least once during the 14 week post-treatment period. The usage effects decreased over time, but seemed to increase again after the belief follow-up. The users had the highest DIpretest scores as well as post test scores, but there seemed to be no interaction between initial values and information. The belief effects were on the same level at the follow-up three months after the treatment. The results were taken as tentative support of the proposed model. The nature of the relations between usage and each of the two factors was discussed as well as a multiplicative weighting of D and E.

by G. Phaner; M. Hane  
Statens Trafiksakerhetsverk, Solna (Sweden)  
Rept. No. 26; Dnr-93-738606-u ; 1973 ; 65p 17refs  
Sponsored by "The Safety Pin" traffic safety fund, AB Svenska Renault.  
Availability: The Swedish Road Safety Office, Driver Licence and Res. Dept., Fack, S-171 20 Solna, Sweden

HS-015 624

#### HYDROGEN-RICH AUTOMOTIVE FUELS: FUTURE COST AND SUPPLY PROJECTIONS

The long-range outlook is for sharp increases in automotive fuel prices, particularly in relation to diminishing fossil (oil, coal) resources. The future costs of carbon-rich fuels are predicted to be four times current prices by 1990 or earlier when they will begin to be supplanted by hydrogen-rich fuels, such as propane and methane. About 50 years hence, hydrogen-rich fuel costs will have escalated ten- to twentyfold, at which time cryogenic hydrogen or methane will become the most economic fuel for transportation vehicles.

by G. A. Hoffman  
University of Southern California, Los Angeles  
Publ: INTERSOCIETY ENERGY CONVERSION  
ENGINEERING CONFERENCE (9th) Proceedings, 1974  
p934-40  
Rept. No. SAE-749103 ; 1974 ; 9refs  
Conference held in San Francisco. Sponsored by the American Society of Mechanical Engineers, New York.  
Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017

HS-015 625

#### TECHNICAL AND ECONOMIC CRITERIA FOR THE SELECTION OF ALTERNATIVE FUELS FOR PERSONAL AUTOMOTIVE TRANSPORTATION

Feasible and practical alternative automotive fuels (non-petroleum) are examined which may be derived from domestic energy sources other than petroleum. The 1985-2000 time frame is considered. Cost, potential availability, compatibility with engines likely to be available in 1985, physical properties, safety and toxicity were among the criteria used for screening. An unsatisfactory rating on a relative or an absolute basis is sufficient reason for eliminating a given fuel unless there is reason to believe that the deficiency can be overcome within the foreseeable future. The most promising alternative fuels are found to be synthetic gasoline and hydrocarbon distillates. Methanol is the next most attractive fuel and could be used as a blending additive or extender to conventional or synthetic gasoline. Hydrogen is a speculative fuel which may become more attractive in the post-2000 time period as fossil carbon resources are depleted.

by G. Hagey; A. J. Parker, Jr.  
Environmental Protection Agency, Washington, D.C.; Mueller (Richard P.) and Associates, Inc.  
Publ: INTERSOCIETY ENERGY CONVERSION  
ENGINEERING CONFERENCE (9th) Proceedings, 1974  
p941-51  
Rept. No. SAE-749163 ; 1974 ; 2refs  
Conference held in San Francisco. Sponsored by the American Society of Mechanical Engineers, New York.  
Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 626

#### IMPROVED PERFORMANCE OF INTERNAL COMBUSTION ENGINES USING 5-30% METHANOL IN GASOLINE

A number of unmodified cars were tested over a fixed course using mixtures of methanol and gasoline. It was found that

mixtures between 5 and 15% increased the fuel economy and performance, and lowered the carbon monoxide emissions and exhaust temperatures. In addition, knock was eliminated on one engine and diesel operation ceased with five percent or greater mixtures. The improved performance of methanol mixtures is attributed to chemical leaning plus the dissociation of methanol near 200 deg C which can absorb energy during the compression stroke of the engine and releases up to 40% hydrogen for a 10% mixture.

by T. B. Reed; R. M. Lerner; E. D. Hinkley; R. E. Fahey  
Lincoln Lab., Lexington, Mass.; Massachusetts Inst. of Tech., Cambridge

Publ: INTERSOCIETY ENERGY CONVERSION  
ENGINEERING CONFERENCE (9TH) PROCEEDINGS,  
1974 952-5

Rept. No. SAE-749104 ; 1974 ; 9refs

Conference held in San Francisco. Sponsored by the American Society of Mechanical Engineers, New York, N. Y. Supported by the National Science Foundation and the Environmental Protection Agency.

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 627

#### FEASIBILITY DEMONSTRATION OF A ROAD VEHICLE FUELED WITH HYDROGEN-ENRICHED GASOLINE

A conventional internal combustion engine was modified to evaluate the concept of using hydrogen-enriched gasoline to allow burning at ultralean mixtures. The modified engine was then tested in a road vehicle to demonstrate its high-efficiency and low-emissions characteristics. The envisioned ultimate system will provide for hydrogen generation aboard the vehicle by the partial oxidation of gasoline. The generated gases will then be mixed with the primary gasoline stream and burned in a conventional engine. Initial feasibility of the concept was demonstrated in laboratory engines and in a passenger car using bottled hydrogen. Engines used in these tests were modified to burn hydrogen-enriched gasoline. These results were compared with those for the stock engine and induction system. At equivalence ratios of 0.53 or less, very low nitrogen oxides and carbon monoxide emissions were produced, and engine thermal efficiency was substantially increased over the stock gasoline configuration. Hydrocarbon emissions were somewhat higher with the modified system, indicating a need for further research to develop effective methods of control. The hydrogen requirement to avoid engine misfire at the ultralean conditions was about 15% by weight of the gasoline.

by R. W. Hoehn; M. W. Dowdy  
California Inst. of Tech., Pasadena. Jet Propulsion Lab.  
Contract NAS7-100

Publ: INTERSOCIETY ENERGY CONVERSION  
ENGINEERING CONFERENCE (9TH) PROCEEDINGS,  
1974 p956-64

Rept. No. SAE-749105 ; 1974 ; 13refs

Conference held in San Francisco, sponsored by the American Society of Mechanical Engineers, New York.

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 628

#### SOME EFFECTS OF LOW AMBIENT AIR TEMPERATURE ON THE PERFORMANCE AND EXHAUST EMISSION OF ENGINES

The role of low ambient air temperatures on the performance and exhaust emissions of engines in general is discussed. Particular consideration is given to observations made on two laboratory engines, a spark ignition and a compression ignition diesel engine of the direct injection type. These engines were operated warm but with variable intake temperature conditions down to very low values.

by G. A. Karim; A. K. Aliyu; S. Khanna  
Calgary Univ., Alta. (Canada)

Publ: INTERSOCIETY ENERGY CONVERSION  
ENGINEERING CONFERENCE (9TH) PROCEEDINGS,  
1974 p965-9

Rept. No. SAE-749106 ; 1974 ; 3refs

Conference held in San Francisco, sponsored by the American Society of Mechanical Engineers, New York. Supported by the National Res. Council of Canada and the Univ. of Calgary (Canada).

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 629

#### THERMAL EFFICIENCY OF THE UNIFLOW STEAM EXPANDER AT 800 TO 1400 DEGREES F. INLET TEMPERATURE

Steam automobiles with piston expanders have been tested for 90 years and have proven capable of operating with low exhaust emissions, but fuel mileage for Rankine cycle vehicles has so far been inferior to that of the conventionally powered automobile. Rankine cycle thermal efficiency can be increased by raising the steam inlet temperature to 1400 degrees F, a limit prescribed by the creep stress of available superheat tubing. A design concept is presented for a single acting uniflow expander with poppet valving, water cooled cylinder walls, and unlubricated piston rings. The calculated thermal efficiency of this expander is shown to be relatively insensitive to inlet pressure. Efficiency increases with inlet temperature, typically from 28% at 800 degrees F to 36% at 1400 degrees F. This improvement in efficiency makes the 1400 degrees F uniflow competitive in fuel mileage with present automobiles.

by R. L. Burton

Steam Power Systems, Inc., San Diego, Calif.

Publ: INTERSOCIETY ENERGY CONVERSION  
ENGINEERING CONFERENCE (9TH) PROCEEDINGS,  
1974 p970-6

Rept. No. SAE-749127 ; 1974 ; 8refs

Conference held in San Francisco sponsored by the American Society of Mechanical Engineers, New York.

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 630

#### DESIGN AND PERFORMANCE OF A BASELINE RANKINE CYCLE AUTOMOBILE

A 3000-lb, four passenger steam automobile was designed and built to provide a baseline for comparison of the progress of steam propulsion and to demonstrate the potential for very low exhaust emissions. The vehicle is powered by a Rankine

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cycle powerplant with a four cylinder inline double-acting compound expander, using water as the working fluid. The expander piston valves are driven by a swing eccentric mechanism to achieve variable cutoff and hence control of expander torque. Steam generator output is 650 lb/hr at 1000 psia and 850 degrees F, at a boiler efficiency of 89%, using unleaded gasoline. The combustor can burn any liquid fuel, including non-petroleum based alternatives, and is currently being tested on methanol and coal-derived oil. The vehicle chassis, suspension and fiberglass body were designed to accommodate the Rankine cycle powerplant. The body is easily removable from the chassis to aid in vehicle development. Present calculated performance figures based on laboratory specific steam consumption for the baseline automobile over the Federal Driving Cycle are 12 mi/gal of unleaded gasoline and emissions of less than half the 1977 Federal Emission Standards for hydrocarbons, carbon monoxide, and nitrogen oxides. Current bench test fuel mileage at 40 mph cruise is 15 mi/gal.

by R. D. Burtz; P. H. Schneider; F. C. Younger; T. E. Duffy; R. L. Burton

Steam Power Systems, Inc., San Diego, Calif.; Brobeck (William M.) and Associates, Berkeley, Calif.; International Harvester Co., San Diego, Calif.

Publ: INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (9TH) PROCEEDINGS, 1974 p977-83

Rept. No. SAE-749128 ; 1974 ; 4refs

Conference held in San Francisco sponsored by the American Society of Mechanical Engineers, New York. Supported by the Assembly Office of Res., Calif. Legislature.

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 631

#### A NEW VAPOR GENERATOR DESIGN FOR RANKINE CYCLE ENGINES

A new vapor generator design is described for use in automotive Rankine cycle engines. The unit consists of a rotational preheater/boiler combined with a monotube superheater. Steady-state heat transfer and stress limitations are discussed. A dynamic model of the system is also presented. It is demonstrated that the gas side heat transfer can be improved with the addition of fins and, that from a stress standpoint, realistic materials, weight, and dimensions are possible. The transient thermal response characteristics are significantly improved over the vapor generator designs currently under consideration.

by F. W. Paul; N. A. Macken; M. Negreanu  
Carnegie-Mellon Univ., Pittsburgh, Pa.  
Grant EPA-R-802466

Publ: INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (9TH) PROCEEDINGS, 1974 p984-90

Rept. No. SAE-749129 ; 1974 ; 10refs

Conference held in San Francisco by the American Society of Mechanical Engineers, New York.

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 632

#### IMPROVEMENT IN THE EFFICIENCY OF THE CONDENSING VAPOR CYCLE IN AUTOMOTIVE POWER SYSTEMS--THE D-CYCLE

The D-Cycle, a thermodynamic cycle which employs wet vapor compression as an integral part of the cycle, is described as an improvement over the standard Rankine cycle. Results are described of two-phase vapor compression in a motored compressor for water and trifluoroethanol-water mixtures (Fluorinol 85). Rate of attainment of temperature and pressure equilibrium between vapor and liquid at constant volume were measured. Like all thermodynamic cycles with a significant work of compression, the D-Cycle is effected by compression efficiency. Ways of applying the cycle are described which are directed towards lowering the ratio of work of compression to work of expansion (the work ratio). Lowering the work ratio in the D-Cycle decreases the ideal efficiency but increases the realizable efficiency. A version of the D-Cycle with isothermal expansion and two-phase compression confers the advantages of multi-stage regeneration and reheat to small condensing vapor systems. A power system suitable for a vehicle is described.

by J. G. Davoud

D-Cycle Power Systems, Inc., Richmond, Va.

Publ: INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (9TH) PROCEEDINGS, 1974 p991-6

Rept. No. SAE-749130 ; 1974 ; 7refs

Conference held in San Francisco sponsored by the American Society of Mechanical Engineers, New York.

Availability: American Society of Mechanical Engineers, 345 E. 47th St., New York, N. Y. 10017

HS-015 633

#### AUTOMOBILE DAMAGEABILITY AND INSURANCE COSTS

Automobile damageability resulting from low-speed collisions is examined. Both crash test and real collision data related to speed and repair costs are considered, as are current legislation and new engineering practices and hardware designed to reduce damage. It is concluded that: automobile manufacturers did not appear to be building increasingly fragile vehicles during model years 1969-72, as alleged by some; 1973 model year vehicles will incur lower repair costs resulting from low speed collisions; regulations effective in the future may further reduce repair costs; benefits will accrue to consumers primarily through reduced vehicle damage repair costs below the deductible amount on collision insurance and to those without collision insurance, and in reduced collision insurance premiums; costs to remove, replace, and install new bumper parts will increase costs to automobile insurers; and new bumper hardware will cause vehicle damage patterns which may require more in-depth inspection by damage estimators and adjusters.

by M. R. Appleby; A. G. R. Morris  
Automobile Club of Southern California, Los Angeles  
Rept. No. SAE-740305 ; 1974 ; 12p 10refs

Presented at the meeting of the Southern Calif. Section held in Los Angeles, 10 May 1973.

Availability: SAE

HS-015 634

HS-015 634

**EXPOSING THE BOOBYTRAPS. A MANUAL FOR CONDUCTING A PUBLIC SERVICE PROJECT TO IDENTIFY AND SEEK REMOVAL OF HIGHWAY HAZARDS**

Operating rules are presented for a public service project to survey roadside hazards such as sign bases, posts, guardrails, and other structures which are likely to cause death or injury to the driver whose car might leave the roadway for an instant. Steps of the public service project are outlined, including news media contact, the survey itself, and follow-up activity. A sample pre-survey press release is given along with a post-survey release and a booby trapped highway report form.

Insurance Information Inst., New York  
1974 ; 11p

Availability: Insurance Information Inst., 110 William St., New York, N. Y. 10038

HS-015 635

**AN ANALYSIS OF ROAD ACCIDENTS INVOLVING CHILD PEDESTRIANS**

In order to obtain absolute measures of accident risk to children of different ages and sex when crossing different types of road, measures of exposure, which can be related to the accident statistics, are required. A suitable framework is devised to achieve this. Measures of exposure were obtained from interviews with children and from traffic density counts on the roads they crossed in the previous 24 hrs. The estimates of risk showed that the raw accident figures greatly underestimate the relative risk to children aged 5, 6, and 7 years, that the greater number of accidents to boys of this age is not due to their greater exposure to traffic, and that by the age of 8, boys, given their greater exposure, are not more at risk than girls.

by C. I. Howarth; D. A. Routledge; R. Repetto-Wright  
Publ: *ERGONOMICS* v17 n3 p319-30 (May 1974)  
1974 ; 9refs

Sponsored by the Dept. of Environment, Transport and Road Res. Lab., Crowthorne, Berks., England. German summary.  
Availability: See publication

HS-015 636

**AN EQUAL SENSATION STUDY OF DIFFERENTIAL VIBRATION BETWEEN FEET AND SEAT**

The equal sensation matching technique has been applied to a situation in which subjects were seated in a car seat without any restraints, and random foot vibration was used as a datum to yield a subjectively judged equal-sensation contour for sinusoidal body vibration. The same random foot vibration was then compared with random body vibration to find a new datum. The equal sensation random body vibration was used as a datum to yield equal-sensation contours for sinusoidal foot vibration. The loop can be concluded by comparing the previously obtained sinusoidal vibration of the feet to that of the body on equal-sensation basis. This procedure gave two sets of results for equal sensation body vibration. Since the second was derived via three equal sensation experiments and agreed well with the first, this experiment gives good substantiation of the equal sensation technique. The information on

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equal sensations for foot and body vibration could find application in the field of vehicle ride research.

by C. Ashley; B. K. N. Rao  
Publ: *ERGONOMICS* v17 n3 p331-42 (May 1974)  
1974 ; 6refs

Sponsored by the Science Res. Council and Birmingham Univ., England. German summary.  
Availability: See publication

HS-015 637

**THE GEOMETRICAL BASIS OF SEAT-BELT FIT**

It is proposed that problems of seat belt fit may be examined by planar development, since when the surface over which the seat belt passes is developed, its path becomes a straight line. A simple geometrical representation of the occupant is suggested for use with such development methods, together with suitable dimensions representing 10th percentile female and 95th percentile male occupants. Criteria are given for determining whether the lie of the seat belt is acceptable. The papers give worked examples to illustrate the method, and an appendix contains a description of its mathematical basis.

by J. A. Searle  
Publ: *ERGONOMICS* v17 n3 p401-16 (May 1974)  
1974 ; 10refs

German summary.  
Availability: See publication

HS-015 638

**ANTHROPOMORPHIC DUMMY AND HUMAN VOLUNTEER TESTS OF ADVANCED AND/OR PASSIVE BELT RESTRAINT SYSTEMS**

Dynamic sled tests of advanced and/or passive belt restraint systems for compact or subcompact cars are discussed. Phase 1 tests using dummies have been completed for eleven (11) systems which were submitted by six different manufacturers. Test results are reported. Phase 2 tests using human volunteers are in progress for systems which generated good performance data during Phase 1 tests. The results of human tests of the first system have been encouraging. Successful injury-free tests of one volunteer subject have been completed with a maximum attained velocity of 30.4 mph at an acceleration level of 21.1 G. Only the results taken from "quick look" preliminary data are reported. Suggestions are made for additional research, development, and test efforts to optimize the performance characteristics of future belt restraint systems and to improve their comfort and convenience.

by T. H. Glenn  
National Hwy. Traf. Safety Administration, Washington, D. C.  
Contract DOT-HS-063-1-081  
Rept. No. SAE-740579 ; 1974 ; 20p 12refs  
Reprinted from 1974 Occupant Protection, P-53.  
Availability: SAE

April 30, 1975

HS-015 644

HS-015 639

**EFFECTS OF DIAZEPAM AND CODEINE, ALONE AND IN COMBINATION WITH ALCOHOL, ON SIMULATED DRIVING**

Effects of single oral doses of codeine, diazepam (Valium), and alcohol on simulated driving were investigated by using a modification of the English Sim-L-car. The driving time was 40 mins. and subjects were told to adapt speed to surroundings and traffic. Placebo increased the inaccuracy of speed estimations. Alcohol increased the numbers of steering wheel reversals and neglected instructions. Diazepam 10 mg increased the number of collisions and neglected instructions, but the greatest increases in collisions was after codeine 50 mg. Diazepam generally enhanced the effect of alcohol.

by M. Linnoila; S. Hakkinen  
Helsinki Univ. (Finland)

Publ: CLINICAL PHARMACOLOGY AND  
THERAPEUTICS v15 n4 p368-73 (Apr 1974)  
1974 ; 13refs

Supported by Suomen Kulttuurirahasto,  
Liikennevakuutusyhdistys, Orion-yhtymä Oy:n Tieteellinen  
Tutkimusrahasto, and Liikenneturva, all of Helsinki.  
Availability: See publication

HS-015 640

**THE HANDICAPPED DRIVER--A NATIONAL SYMPOSIUM**

Evidence of safe driving by handicapped drivers is presented in a report of a national symposium on the subject attended by physicians, therapists, counselors, insurance company representatives, and directors and instructors from driver training schools. An electronic driving simulator is described which is used for evaluating driver potential especially of hemiplegics and paraplegics. Experiences with road training are cited along with instructor qualities, restrictive licensing, and handicapped driver performance. Problems related to underwriting insurance for the handicapped driver are considered, and variations in statistics concerning his safety are mentioned. Road tests of several automotive controls also are reported.

by C. Long, 2nd  
Publ: JOURNAL OF REHABILITATION v40 p34-8 (Mar-Apr 1974)  
1974  
Availability: See publication

HS-015 641

**AN AUTOMOBILE EXHAUST EMISSION MODEL**

A mathematical model of an automobile's emission rate is described, which can be used to calculate the amounts of hydrocarbons, carbon monoxide, and oxides of nitrogen emitted by individual or groups of automobiles being driven over any known driving sequence. The development of the model requires the amounts of three pollutants given off by individual automobiles over short duration driving sequences (modes). The validity of the model is investigated by using it to calculate the amounts of each pollutant given off by individual automobiles over the hot transient portion (first 505 s) of the Federal Test Procedure driving sequence. These predicted emissions are then compared with observed amounts

emitted from each automobile. Further, the ability of the model to predict emissions is investigated in light of the reproducibility of actual automobile emissions measured in replicated tests. These analyses indicated that the model performs extremely well. The model is intended to be used to predict emissions from automobiles being operated within the ranges of speed and acceleration covered in the input emission data.

by P. Kunselman; H. T. McAdams; M. E. Williams; C. J. Domke

Calspan Corp., Buffalo, N. Y.; Environmental Protection Agency, Washington, D. C.

Rept. No. SAE-740538 ; 1974 ; 11p 1ref

Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974. Portions of the data were obtained by Automotive Environment Systems, Inc., under Contract EPA-68-04-0042, and by Olson Labs., Inc., under Contract EPA-68-01-0410.

Availability: SAE

HS-015 642

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF OREGON. 1972 ACCIDENT YEAR**

Oregon's conversion of state accident data to uniform accident data tape format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including motor vehicle traffic accident card format, police accident reports, motor vehicle traffic accident coding instructions (April, 1969), and memoranda containing revisions to those coding instructions.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472

1973 ; 151p

Availability: Safety Management Inst., 1660 L St., N. W., Suite 709, Washington, D. C. 20036

HS-015 643

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF RHODE ISLAND. 1971 ACCIDENT YEAR**

Rhode Island's conversion of state accident data to uniform accident data tape format for the 1971 accident year is presented. The data element availability is described along with the conversion logic and examples of state materials, including Investigator's and Police Accident Report, record layout, and coding instructions.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472

1973 ; 88p

Availability: Safety Management Inst., 1660 L St., N. W., Suite 709, Washington, D. C. 20036

HS-015 644

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT.**

HS-015 645

**STATE OF SOUTH CAROLINA. 1971 ACCIDENT YEAR**

South Carolina's conversion of state accident data to uniform accident data tape format for the 1971 accident year is presented. The data element availability is described along with the conversion logic and examples of state materials, including accident research programming aid materials and the Accident Research Recorder's Manual for 1970.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 116p  
Availability: Safety Management Inst., 1660 L St., N. W., Suite 709, Washington, D. C. 20036

HS-015 645

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF SOUTH DAKOTA. 1972 ACCIDENT YEAR**

South Dakota's conversion of state accident data to uniform accident data tape format for the 1972 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including: Officer's Investigation Summary of Motor Vehicle Accident; Highway Patrol Motor Vehicle Accident Study Coding Manual; Department of Highways Motor Vehicle Accident Study Coding Manual; and record layout sheets.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 123p  
Availability: Safety Management Inst., 1660 L St., N. W., Suite 709, Washington, D. C. 20036

HS-015 646

**CONVERSION OF STATE ACCIDENT DATA TO UNIFORM ACCIDENT DATA TAPE FORMAT. STATE OF TEXAS. 1971 ACCIDENT YEAR**

The conversion of Texas state accident data to uniform accident data tape format for the 1971 accident year is presented. The data element availability is given along with the conversion logic and examples of state materials, including traffic accident code sheets and instructions (1971), and Texas Peace Officer's Accident Report and Accident Casualty Supplement.

Safety Management Inst., Washington, D. C.  
Contract DOT-HS-021-2-472  
1973 ; 114p  
Availability: Safety Management Inst., 1660 L St., N. W., Suite 709, Washington, D. C. 20036

HS-015 647

**CRASH PROTECTION FOR THE SUB-TEEN CHILD**

A program of simulated car crashes and examinations designed to evaluate the child restraints currently available in Australia is described. Each restraint was subjected to crash simulations producing deceleration forces equal to 17 times the weight of the occupant. During each crash, data such as harness forces, deceleration and velocity were recorded and high speed mo-

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vies were provided. It was concluded that, in general, SAA-approved devices afforded a degree of protection adequate to ensure survival of the occupant in most real life frontal collisions, but there were some aspects of approved devices which could be improved. In general, non-approved devices were considered inadequate in at least some respects, while some could easily be modified to satisfy safety requirements. The report concludes with detailed appraisals of the following commercial products manufactured in Australia, Canada, Britain, or the U.S.: Micklem 694, 725, 710, and 715; Steelcraft C54, C57, C45, and C52; Britax B335, B336, and B338; Safe-N-Sound Premier X4, KL, and SS150; Volvo; General Motors "Love" seat; Guardwell CS200; adult's lap/sash and lap belts; and Clippa Safe "Trainer" and "Pilot".

by D. C. Herbert; B. A. Vazey; J. M. Wyllie; V. Leitis; J. D. Stott; R. G. Vaughan  
New South Wales Dept. of Motor Transport, Sydney (Australia)  
Rept. No. 4/74 ; 1974 ; 154p 25refs  
Availability: Traffic Accident Res. Unit, Dept. of Motor Transport, New South Wales, Australia

HS-015 648

**VIRGINIA'S ALCOHOLIC REHABILITATION PROGRAM**

The scope of the alcoholism problem in general and Virginia's rehabilitation program in particular are described. Alcoholism is determined to be the greatest unsolved public health problem with widespread impact. Methods of treatment are mentioned, and the history of the Virginia program is traced. Care for the alcoholic includes medical care in the hospital as well as a post-hospital program of after care services which focuses on psychological and social readjustment. Reasons for such special treatment are reviewed. The Virginia Division of Alcoholism Services provides alcoholism counselors who are sent to the hospital to counsel the patient about to be discharged. The program utilizes the concepts of Treatment Transition Management and the Community Alcoholism Center. The essentials of rehabilitation include detoxification, special physician orientation and training, medical care (e.g., tuberculosis), after-care or post-detoxification services, timeliness, and continuity of care. Fifteen questions are posed to help determine alcoholism. Residential recovery facilities and the implementation of rehabilitation programs are also described.

Publ: VIRGINIA HEALTH BULLETIN v25 ser2 n4 p2-20  
(Apr-Jun 1973)  
1973  
Availability: See publication

HS-015 649

**TRAFFIC ACCIDENT FACTS 1973. AN ILLUSTRATED ANALYSIS OF ACCIDENT RECORDS**

Statistical data from the Florida Highway Patrol are presented in tabular and graphic form. Details are given on: feature facts; contributing causes of accidents; time lines; accidents and fatalities by month; holiday traffic accidents; traffic fatality map; traffic death in Florida by county; Florida traffic

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trends; traffic statistics; estimated property damage and economic loss; state, county, and city-maintained roads.

Florida Dept. of Hwy. Safety and Motor Vehicles  
1974 ; 23p  
Availability: Bureau of Records and Training, Dept. of Hwy.  
Safety and Motor Vehicles, Div. of Florida Hwy. Patrol

HS-015 650

#### **EFFECTS OF ALCOHOL ON CHOICE REACTION TIME**

The effects of alcohol on choice reaction time, information transmission and task performance were studied in five men (aged 23-28 years) who completed a key-pressing task after drinking 0, 0.26, 0.52, and 0.78 ml of alcohol per kg of body weight (as vodka containing 43% alcohol) mixed with orange juice. Breathalyzer measurements, taken immediately before, during, and after the task showed mean peak blood alcohol concentrations after the 3 doses to be 0.001, 0.037, and 0.055%. Reaction time was tested mostly during the declining phase of the blood alcohol curve. None of the doses of alcohol had a significant effect on choice reaction time, information transmission, or number of errors. The lowest rate of error was achieved after the 0.26 ml per kg dose, suggesting a facilitating effect. Accuracy appeared to be more sensitive than speed to the effects of alcohol. It is concluded that complex motor skills are more likely to be affected by low doses of alcohol than cognitive functions.

by M. L. Shillito; L. E. King; C. Cameron  
Publ: QUARTERLY JOURNAL OF STUDIES ON  
ALCOHOL v35 n3 p1023-34 (Sep 1974)  
1974 ; 35refs  
Availability: See publication

HS-015 651

#### **DDC--THE FIRST 10 YEARS**

The Defensive Driving Course (DDC) is reviewed after 10 years of use and almost six million graduates, with focus on how DDC was put together as a training course and then built into a workable delivery system. The course was organized around two themes: the definitions of defensive driving and/or preventable accident. Other elements built into the course were: the standard classification of fatal accident types used in city, state, and national traffic fatality reports; and a classification system for two-car collisions. The Standard Accident Prevention Formula was adopted to help the driver recognize the hazard, understand the defense, and act in time. Means for public education and acceptance are outlined, along with the use of unpaid volunteer instructors. Further discussion is given to quota goals, program evolution, official films, student workbooks, slogans, and personnel and contributing organizations and corporations.

by C. Imhoff  
Publ: TRAFFIC SAFETY v74 n10 p8-11, 35-7 (Oct 1974)  
1974  
Availability: See publication

HS-015 652

#### **BIG CAR, SMALL CAR AND THE TRAFFIC MIX**

The conflict between large and small cars in traffic is discussed at the Third International Congress on Automotive Safety. The more adequate protection to occupants provided by the large cars was stressed along with the small car proponents' contention that small cars are more maneuverable in avoiding accidents and their drivers more careful. Remarks by various participants are mentioned which deal with the hazards of the traffic mix, experimental safety vehicle prototypes, mathematical examinations of the problem of collisions between small and large cars, referring to Newton's Second Law of Motion, vehicle collisions with cyclists and pedestrians, vehicle crashworthiness design, foam as an energy absorption material, vehicle modification, injuries by vehicle size, accident statistics, and energy considerations.

by P. Hill  
Publ: TRAFFIC SAFETY v74 n10 p16-8, 39-40 (Oct 1974)  
1974  
Availability: See publication

HS-015 653

#### **THE FORGOTTEN PEDESTRIAN**

The extent of the pedestrian accident problem is discussed along with methods to control the fatality rates by engineering, enforcement, and education. Engineering aspects include traffic signal visibility, site studies, elimination of painted crosswalks, barrier fence use, parking regulations, and approaches for handicapped pedestrians and school children in bus zones, parking lots, sidewalks, and driveways. Revised vehicle frontal design is suggested. Safety education is seen as the strongest hope for promoting desirable pedestrian behavior, and can be achieved through educational television, pedestrian violator schools, research on the behavior and perception of the driver as a pedestrian, and behavior modification through recognition and rewards. Enforcement is seen as a test of the educational program, and the effectiveness of crossing guards is emphasized. Cooperation among government agencies, schools, police, engineers, parent groups, and automobile clubs is also considered.

by P. Harrison  
Publ: TRAFFIC SAFETY v74 n10 p22-4, 32-3 (Oct 1974)  
1974  
Adapted from presentation given at the National Hwy. Safety Conference Sponsored by the National Safety Council and the Hwy. Users Federation.  
Availability: See publication

HS-015 654

#### **NIGHT SIGHT**

An American study of night vision and the effects of age and glare on the driver is presented along with a report of a conference of the Association of Optical Practitioners. It is shown that for a driver, the middle transitory period between dark and light adaptation is most important. A chart indicates the change in illumination necessary to see a standard briefly viewed, moving stimulus with increasing age. Problems related to British government concern with vision effects on driving are described, including licensing regulations and eye tests.



HS-015 655

Research on driving in reduced visibility conditions is reviewed.

by C. Goffey; A. Shanks  
Publ: AUTOCAR v141 n4059 p20-2 (w/e 10 Aug 1974)  
1974 ; 1ref  
Availability: See publication

HS-015 655

**THE RELATIONSHIPS BETWEEN SPEED, SPEED LIMITS, AND MOTOR VEHICLE ACCIDENTS. AN ANNOTATED BIBLIOGRAPHY**

The annotated bibliography on the relationships between speed, speed limits, and accidents was derived from a literature search initiated in connection with the controversy regarding the safety benefits of the national 55 mph speed limit. One hundred publications issued since 1960 were reviewed. In general, the literature showed that lowered speed limits reduce the number of vehicles traveling at high speeds, the mean speed of traffic, the dispersion of speeds about the mean, and the number of serious- and fatal-injury accidents. It is evident from the survey, however, that existing data do not contain sufficient detail concerning the pre-accident situation to clearly define the causes of accidents or to suggest countermeasures that might prevent them.

by J. E. Haney; K. Weber  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Rept. No. UM-HSRI-RI-74-1 ; 1974 ; 20p 91refs  
Availability: Corporate author

HS-015 656

**PROPERTIES OF REINFORCED PROPYLENE/ACID COMPOUNDS**

A new generation of glass fiber or asbestos filled propylene/acid copolymers is described in which the matrix resin adheres chemically to reinforcing filler. The adhesion results from the incorporation of the functional comonomer and produces enhanced physical properties of the composite even in pigmented parts. Other benefits of the adhesion include gloss and reduced loss in physical properties due to glass fiber attrition during the compounding step compared to conventional polypropylene polymers. Compounding techniques for incorporating the glass fibers into the resin are discussed.

by R. A. Van Brederode; R. A. Steinkamp; K. W. Bartz; K. L. Trachte; D. G. Stenmark  
Esso Res. and Engineering Co., Linden, N. J.  
Rept. No. SAE-740292 ; 1974 ; 8p 8refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

HS-015 657

**FRACTURE CONTROL PLANNING--PREREQUISITE TO STRUCTURAL RELIABILITY**

An engineer-user point of view supporting the desirability of rational fracture control planning in critical structural designs is presented. The impending need for its consideration in future truck frame design is cited as an example. A general discussion of applicable fracture mechanics and fracture

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planning concepts is given. The application of these principles in the formulation of a fracture control philosophy for selection of steel for heavy truck frame fabrication is discussed. Data obtained from appropriate fracture tests of several truck frame steel compositions are given for exemplary purposes.

by D. J. Baron  
SMith (A.O.) Corp., Milwaukee, Wis.  
Rept. No. SAE-740293 ; 1974 ; 9p 11refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-015 658

**CAB ISOLATION AND RIDE QUALITY**

Improved ride quality through cab isolation on tractor semitrailers is predicted. Analysis techniques, test data, and ride evaluation criteria are described which have been used to design cab isolation systems. Computer simulations of improved cab ride are presented for both conventional and cab-over-engine tractors.

by M. J. Crosby; R. E. Allen  
Lord Kinematics, Erie, Pa.  
Rept. No. SAE-740294 ; 1974 ; 11p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

HS-015 659

**DESIGN FEATURES AND INITIAL PERFORMANCE DATA ON AN AUTOMOTIVE STEAM ENGINE. PT. 1.-OVERALL POWERPLANT DESCRIPTION AND PERFORMANCE**

Progress in the development of an automobile Rankine engine using water as the working fluid and a four-cyl uniflow reciprocating expander is described. Design details of the system are presented including a description of major components and packaging arrangements of the system in a six-passenger car. Results of the development testing are presented illustrating that the exhaust emissions are well below the current 1977 federal standards and the fully condensing prototype system will be capable of performance and fuel economy substantially equal to current emission-controlled gasoline engine vehicles.

by L. C. Hoagland; R. L. Demler; J. Gerstmann  
Scientific Energy Systems Corp., Watertown, Mass.  
Contract EPA-68-04-0004  
Rept. No. SAE-740295 ; 1974 ; 20p 6refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-015 660

**DESIGN FEATURES AND INITIAL PERFORMANCE DATA ON AN AUTOMOTIVE STEAM ENGINE. PT. 2.-RECIPROCATING STEAM EXPANDER--DESIGN FEATURES AND PERFORMANCE**

The design and fabrication of a four-cyl in-line trunk piston steam expander suitable for a standard six-passenger automo-



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bile are described. Series poppet admission valving is used with variable cutoff of steam to the expander attained by variable phasing of one camshaft with the aid of a hydraulically operated cam phasing mechanism. A specially formulated lubricant is used which allows expander operation with steam at 1000 degrees F/1000 psig. Preliminary performance measurements for the expander are presented and results are thought to be good considering the maturity of the system. Improvements to the expander which will result in increased efficiency are discussed.

by W. E. Syniuta; R. M. Palmer  
Scientific Energy Systems Corp., Watertown, Mass.; Ricardo and Co. Engineers Ltd., Dorchester, Dorset (England)  
Contract EPA-68-04-0004  
Rept. No. SAE-740296 ; 1974 ; 19p 7refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974  
Availability: SAE

HS-015 661

#### **AUTOMOTIVE ORGANIC RANKINE-CYCLE POWERPLANT--DESIGN AND PERFORMANCE DATA**

An automotive powerplant using an organic Rankine cycle engine has been designed, built, and tested in a preprototype configuration. A description of the system and results from expander, combustor, and preprototype system testing is presented. Emission results show that the system could meet the 1976 emission standards specified in the 1970 Clean Air Act. Performance and fuel consumption predictions are presented for a prototype system based on both experimental and analytical results obtained to date. The Rankine cycle engine offers the potential for high reliability, low maintenance requirements, moderate cost, good driveability, and good fuel economy.

by P. Patel; E. F. Doyle; R. J. Raymond; R. Sakhuja  
Thermo Electron Corp., Waltham, Mass.  
Rept. No. SAE-740297 ; 1974 ; 14p 8refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-015 662

#### **TURBINE RANKINE CYCLE AUTOMOTIVE ENGINE DEVELOPMENT**

The potential of the Rankine cycle engine as a low emission alternative to the internal combustion automotive engine is evaluated. An organic fluid turbine engine was designed, fabricated, and tested, and a steam turbine engine is being prepared for vehicle road tests. Based on fuel economy of 10 miles/gal, emissions less than one-fourth of 1975-1976 federal standards have been demonstrated. Performance equivalent to the internal combustion engine without exhaust emission controls appears feasible with further development.

by J. N. Hodgson; F. N. Collamore  
Aerojet Liquid Rocket Co., Sacramento, Calif.  
Contract EPA-68-04-0005; LCB-19651  
Rept. No. SAE-740298 ; 1974 ; 15p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-015 663

#### **CONSISTENCY STUDY FOR VEHICLE DEFORMATION INDEX**

Thirty-three teams representing nine European and North American nations, and participating in an international program of accident investigation, formulated a standardized procedure for collecting vehicle damage and occupant injury data and classified vehicle damage according to the Vehicle Deformation Index (VDI). A consistency study was performed to determine how well the diverse group of investigators, many with limited investigative training and/or experience, could use the VDI. One-half of the team ratings, excluding 520 cases collected by Southwest Research Institute, compared identically with the control ratings; approximately 75% of the ratings compared identically or differed by only one character. A detailed report is made.

by J. R. Cromack; S. N. Lee  
Southwest Res. Inst., San Antonio, Tex.; National Hwy. Traf. Safety Administration, Washington, D. C.  
Rept. No. SAE-740299 ; 1974 ; 7p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-015 664

#### **VEHICLE AND OCCUPANT FACTORS THAT DETERMINE OCCUPANT INJURY**

The relationships among the vehicle-related factors (velocities, masses, crush and rebound characteristics) which determine injury potential are analyzed. It is shown that the injury potential can be estimated for actual crashes from some of the better defined vehicle-related factors. Computer simulation results for injury-related criteria as a function of occupant-related factors over the range of injury potential of interest are given. The analysis results in conclusions applicable to many areas of automotive safety.

by J. F. Marquardt  
General Motors Corp., Warren, Mich. Environmental Activities Staff  
Rept. No. SAE-740303 ; 1974 ; 18p 10refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-015 665

#### **SYMBOL STUDY--1972**

The International Organization for Standardization, Technical Committee 22, Subcommittee 13, Working Group 5 was given the task of determining which symbols should be proposed for standardization for 15 controls, indicators, and telltales. A test was devised in which three different symbols for each given control, indicator, or telltale could be appraised by licensed drivers in a simulated driving situation. Data from 2593 licensed drivers from France, Germany, the United Kingdom, and the United States were obtained and statistically treated. The procedures and results are reported. On the basis of these

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results, symbols for 12 controls, indicators, and telltales were proposed as standards.

by E. A. Heard  
International Organization for Standardization, Geneva  
(Switzerland)  
Rept. No. SAE-740304 ; 1974 ; 22p 18refs  
Presented at the Automotive Engineering Congress, Detroit, 25  
Feb - 1 Mar 1974.  
Availability: SAE

HS-015 666

#### STEAM CARS: ON THE ROAD FOR A COMEBACK

Revived interest in the steam car is discussed along with a review of the early development of the vehicle by the Stanley brothers. Current prototype cars developed in California are cited. Technical progress is being made in research laboratories, such as Lear Motors' laboratory version of the Rankine cycle engine which demonstrated fuel economy and emission control, and other companies. American competition from Australia in prototype steam engines is cited, and it is noted that early problems are being overcome. Advantages over the internal combustion gasoline motor include the lack of need for a starting motor, carburetor, cooling system, complex ignition wiring, muffler, or smog control devices. Some of the new steam engines can burn practically any fuel, and never need tuning.

by W. L. Roper  
Publ: CALIFORNIA HIGHWAY PATROLMAN v38 n7 p4-6,  
22-3, 26, 30-1, 33-4 (Sep 1974)  
1974  
Availability: See publication

HS-015 667

#### SEAT BELT USAGE AND BENEFITS IN NORTH CAROLINA ACCIDENTS

Restraint system benefits are evaluated, based on lap belt and shoulder harness usage rates and injury reduction benefits for all seating positions in North Carolina accident-involved vehicles. The restraint system data were collected in addition to the accident information normally collected by the North Carolina State Highway Patrol in the summer of 1970. Detailed analyses were conducted based on accident type, impact site, estimated speed just prior to contact, and non-belted and belted frequencies for both serious and minor injuries. Depending on the available sample sizes, chi-square, Poisson, or binomial tests were employed to detect significant differences between the belted and unbelted groups. The results further document previous findings which show the effectiveness of lap belts and shoulder harnesses and point out the continuing need for programs aimed at increasing restraint system usage rates.

by F. M. Council; W. W. Hunter  
North Carolina Univ., Chapel Hill. Hwy. Safety Res. Center  
1974 ; 82p 15refs  
Sponsored by the North Carolina Governor's Hwy. Safety  
Program (Traf. Records Grant N-310-73-001-001) and the  
Insurance Inst. for Hwy. Safety.  
Availability: Corporate author

HSL 75-4

HS-801 201

#### NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION--NAVAL AIR DEVELOPMENT CENTER ADVANCED RESTRAINT SYSTEMS DYNAMIC TEST PROGRAM. PHASE REPORT

A research program at the Naval Air Development Center is described which utilized the center's horizontal accelerator facility to conduct dynamic tests on advanced passive seat belt restraint systems using both anthropometric dummies and human volunteers. The work described covers the anthropometric dummy portion of testing (Phase I). The objectives are: to evaluate the degree of occupant crash protection afforded by each system; to measure the dynamic response of the dummy when exposed to impact accelerations for later comparison with human response under similar conditions; to ascertain the structural safety of the restraint system before human testing; and to select candidate systems for human testing. It was found that the restraint systems submitted for testing differed considerably in degree of sophistication and hardware development. Eleven systems were tested, all but one being of the diagonal strap and lap belt configuration. Variations in dummy response were attributed to: differences in input acceleration-time crash signatures; location of diagonal torso and lap belt on dummy; degree of harness tightness; seating surface, angle, padding, springs and structural characteristics; length, width and type of harness material; and variations in dynamic dummy performance. Five of the systems tested completely satisfied the injury criteria of FMVSS 208 for a 30mph barrier crash. The most difficult criterion to satisfy was the head injury criterion limitation to 1000. Test procedures (test dummies, crash signatures, automotive silhouette, and equipment re-use) as well as data processing (high speed photographic coverage, monitored data, instrumentation, and data reduction) are detailed. Each system is described and evaluated individually, and discussions of results, including graphs and photographs, are given.

by E. Bloom  
Naval Air Devel. Center, Warminster, Pa. Crew Systems Dept.  
Contract DOT-HS-063-1-081-IA  
Rept. No. AD-786 379; NADC-74182-40 ; 1974 ; 256p 7refs  
Availability: NTIS

HS-801 286

#### AUTOMOTIVE RECORDER RESEARCH. A SUMMARY OF ACCIDENT DATA AND TEST RESULTS

Progress made in the Disc Recorder Pilot Project as of March 31, 1974, is described. The recorders can measure crash triaxial acceleration/time histories during vehicle collisions. Recorder data from accidents involving vehicles equipped with disc recorders are discussed and compared with associated reports by accident investigators. Crash tests to which the disc recorders have been subjected are described along with an evaluation of results. Because of the recorder accuracy, confirmed by these tests under different speeds and conditions, it

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is concluded that the disc recorders are valid instruments for measuring vehicle crash severity.

by S. S. Teel; S. J. Peirce; N. W. Lutkefedder  
National Hwy. Traf. Safety Administration, Washington, D. C.  
Rept. No. SAE-740566 ; 1974 ; 77p 16refs  
Presented at the International Conference on Occupant  
Protection (3rd), Troy, Mich., 10-12 Jul 1974. See also HS-015  
672.  
Availability: NHTSA

HS-801 290

#### **HYBRID COMPUTER VEHICLE HANDLING PROGRAM. FINAL REPORT**

A hybrid computer simulation for vehicle handling studies has been implemented, checked out, and validated. The simulation has been programmed to study both solid rear axle and independent rear suspension vehicles. Model validation was accomplished using parametric data representative of four 1971 vehicles: Volkswagen Super Beetle, Chevrolet Brookwood, Dodge Coronet, and Pontiac Trans AM. Braking, steering, and combinations of braking and steering were the inputs to the simulated mathematical model for the validation tests. This hybrid vehicle handling program can be used for general studies of vehicle dynamics. Performance of the standard passenger car vehicle handling test procedures and calculation of the associated comparison variables are simulation options. A special interactive user's interface has been added to allow program use by vehicle engineers as well as computer specialists. User experience with the program has shown that while performing parametric runs, 500 seconds of vehicle motion can be simulated in one hour of computer use. This translates to a cost of less than \$0.50 per vehicle simulation second. This should be viewed as the current lower cost limit. Although good correlation between program and full-scale test data has been achieved, it is recommended that changes in all areas of the model, including the tire road interface, the vehicle description, and others, be given serious consideration where an improvement in correlation could result.

by P. F. Bohn; R. J. Keenan  
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.  
Contract DOT-HS-213-3-695; Ref: DOT-HS-053-3-727  
Rept. No. CP-037/TSA-003; BCE-T-0530 ; 1974 ; 357p 16refs  
Rept. for Jun 1973 - Jul 1974.  
Availability: NTIS

HS-801 293

#### **DETERMINATION OF THE TRADEOFFS BETWEEN SAFETY, WEIGHT, AND COST OF POSSIBLE IMPROVEMENTS TO VEHICLE STRUCTURE AND RESTRAINTS. FINAL REPORT**

A tradeoff study between safety, weight, and cost of possible improvements to vehicle structures is described. Safety gains were evaluated primarily by means of crash simulations performed using the NHTSA/Battelle Four-Mass Per Car Collision Model (FMCCM) computer program. The topical framework for this study includes: a literature search; the development of a restraint system model and survival criterion; the development of energy absorber characteristics; FMCCM simulations; a potentially new method for utilizing accident data statistics; and dynamic response tuning study. The results indicate both the likely incremental gains in crash

energy management which can be obtained with an increase in weight and costs; and the level of complexity involved in assessing such gains when the chosen analysis includes consideration of tuning the vehicle structure to the restraint system, variations in vehicle loading, and present and projected accident statistics.

by G. H. Alexander; R. E. Conrad; M. R. Neale  
Battelle Columbus Labs., Ohio  
Contract DOT-HS-322-3-621  
Rept. No. DOT-HS-322-3-621-3 ; 1974 ; 273p 87refs  
Report for Apr 1974 - Oct 1974.  
Availability: NTIS

HS-801 295

#### **MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JULY 1, 1974 TO SEPTEMBER 30, 1974**

Safety defect recall campaigns of foreign and domestic motor vehicle and equipment manufacturers are summarized. The campaigns are tabulated by corporation with details given on date of company notification, make, model, model year, type of defect, number of pages on file, and number of vehicles recalled.

National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 42p  
Availability: GPO

HS-801 306

#### **DEVELOPMENT OF ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUBCOMPACT CAR DRIVERS. PROGRESS REPORT, NOVEMBER 1974**

A 50 mph barrier crash test is described as part of the advanced passive restraint system. To prevent structural deformation from impinging upon the column support points and therefore changing the orientation of the restraint with respect to the driver, support points were relocated. All of the interfaces with the vehicle structure were kept away from areas of high structural deformation. The seat was also relocated to better protect the driver. The 50 mph frontal barrier test with the 50th percentile male anthropomorphic driver resulted in high chest g's, found to be caused by failure of the combustion chamber inflator. The problem was exaggerated further by the inadvertent use of an outer air bag which had 30% more volume than desired, resulting in inability of the restraint system to function normally and in the chest bottoming out on the steering wheel rim. Photographs and graphs are included.

by M. Fitzpatrick  
Minicars, Inc., Goleta, Calif.  
Contract DOT-HS-113-3-742  
Rept. No. PR-Nov-74 ; 1974 ; 15p  
Availability: NHTSA

HS-801 307

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**PASSENGER VEHICLE FRONT-END ALIGNMENT SURVEY. TECHNICAL REPORT**

A test vehicle with known front-end alignment specifications was circulated among commercial establishments which perform front-end alignments. The front-end alignment values of the test vehicle remained unchanged throughout the survey. Commercial establishment front-end alignment values when analyzed revealed a high variance and poor validity when compared to reference machine values. The major portion of the variance may be attributed to invalid machine calibration and operator error.

by L. H. Emery  
National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 42p  
Report for Sep 1973 - Mar 1974.  
Availability: NTIS

HS-801 309

**COLLISION AVOIDANCE RADAR BRAKING SYSTEM INVESTIGATION (PHASE 1). FINAL REPORT**

The results are described of an investigation of automotive collision avoidance radar braking system concepts and technology. The purpose of this three-month study program, which constitutes Phase 1 of a multi-phase NHTSA effort, has been to assess the state-of-the-art of current radar braking technology and to arrive at a comprehensive definition of the radar braking concept. The concept definition includes a characterization of the many factors which enter into the concept, the techniques which are applicable to the concept, and a determination of the problem areas which require additional research. Among the subject areas receiving special attention were: identification and analysis of the manner in which driver, driving environment, and vehicle characteristics in conjunction with radar braking objectives, affect the requirements of the system; characterization of the subsystems of the radar braking concepts as to the function, tradeoffs, alternative implementation, and technology limitations; appraisal of the current state-of-the-art in radar braking techniques and systems; generation of candidate braking systems and radar techniques; and analysis of accident statistics to determine the relative benefits of the candidate system configurations.

by G. Demos; S. Kazel; R. Carlson; O. Viergutz; D. Morita; D. Lanera  
IIT Research Inst., Chicago, Ill.  
Contract DOT-HS-4-00935  
Rept. No. E6306-1 ; 1974 ; 307p 39refs  
Report for Jun 1974 - Sep 1974.  
Availability: NTIS

HS-801 310

**CRASH INJURY MANAGEMENT INSTRUCTOR TRAINING INSTITUTE. FINAL REPORT**

The NHTSA-developed curriculum materials for crash injury management were introduced and key individuals were trained to teach the subject. Five 30-hour instructor training institutes were conducted in educational institutions in various areas of the country. Through its regional offices, State governor's representatives, and state or local agencies, NHTSA identified

and referred candidates to attend each institute. 78 enrollees representing 37 States, Puerto Rico, the District of Columbia, and NHTSA completed the course. All enrollees were associated with law enforcement or emergency medical services. 73% of the enrollees expect that their organizations will use all or some of the curriculum materials in future training. 93% of the enrollees reported that the institute was valuable to them.

by A. M. Clevon  
Dunlap and Associates, Inc., Darien, Conn.  
Contract DOT-HS-4-00847  
1974 ; 231p  
Report for 10 Jun 1974 - 10 Oct 1974. Prepared in cooperation with Central Connecticut State Coll., New Britain.  
Availability: NTIS

HS-801 311

**INFLATABLE BELT DEVELOPMENT FOR SUBCOMPACT CAR PASSENGERS. PROGRESS REPORT, NOVEMBER 1974**

Progress on the development of an inflatable belt for subcompact car passengers is reported in terms of three specific tasks: fabrication and testing of a new, larger capacity inflator for the air belt; commencement of the development sled test series; and preparation for a briefing on the project. Development sled tests are described which were conducted with the two-point version of the inflatable belt. The belt was redesigned for a third and final test to prevent the belt breaking. Sketches of the improved design are given in which the belt webbing was extended for the full belt length rather than just at the belt ends. The use of the two diameter air belt was also discontinued in favor of a constant diameter belt to eliminate all possibility of a recurrence of the belt failure at the point of stress concentration that exists at the transition between the two belt diameters.

by M. Fitzpatrick  
Minicars, Inc., Goleta, Calif.  
Contract DOT-HS-4-00917  
1974 ; 31p  
Availability: NHTSA

HS-801 313

**A STUDY OF HEAT, NOISE, AND VIBRATION IN RELATION TO DRIVER PERFORMANCE AND PHYSIOLOGICAL STATUS. FINAL REPORT**

The effects of heat, noise, and vibration on the driving performance, subjective feelings of alertness and fatigue, and physiological signs of stress among drivers of passenger cars and trucks were examined in three experimental studies. In the study of the effects of temperature on male and female passenger car drivers, stress was shown to significantly affect both driver performance and various indices of central nervous system arousal felt to be important to driving safety. A study of the effects of heat on the physiological status and driving performance of truck drivers was to extend the observations on the effect of heat stress to trucking operations and to expand upon the knowledge gained from experiment 1 concerning the effects of heat stress on driver physiology and performance. Experiments 1 and 2 were designed to examine the effects of a variety of temperature conditions on driver physiology and driver performance under circumstances where motor vehicle operations was required for relatively extended

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periods of time in the operational environment. Experiment 3 proved that the noise stress was sufficient to induce permanent loss of hearing in some drivers and that the amount of vibration stress, unless compensated for by properly designed seats, was borderline with respect to current standards for fatigue-decreased proficiency. A review of pertinent literature on stress and human reactions to it is included.

by R. R. Mackie; J. F. O'Hanlon; M. McCauley  
Human Factors Res., Inc., Goleta, Calif.  
Contract DOT-HS-241-2-420  
Rept. No. HFR-1735 ; 1974 ; 271p 58refs  
Report for Jun 1972 - Jun 1974.  
Availability: NTIS

HS-801 314

#### **ANNUAL REPORT TO THE SECRETARY ON ACCIDENT INVESTIGATION AND REPORTING ACTIVITIES--1973 (4TH)**

DOT Order 2000.1 dated October 31, 1968, calls for an annual report to be submitted each year to the Secretary by each operating Administration. This report contains: a listing of National Transportation Safety Board (NTSB) recommendations received and National Highway Traffic Safety Administration (NHTSA) responses; a brief discussion of unsolved issues resulting from NTSB recommendations; response to specific statement in the DOT Order, including statutory scheme on accident investigations, problems between NHTSA and NTSB and any recommended changes in relationships or legal authority; and a summary of NHTSA accident investigation activities. Consideration is given to tri-level studies, special studies, and multidisciplinary accident investigation teams.

by S. N. Lee; E. E. Flamboe  
National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 39p  
Availability: NHTSA

HS-801 316

#### **BUMPER SYSTEMS. SOFT FACE VS. MODEL 1974 STEEL SYSTEM**

The engineering, economic and national resource feasibility of soft-face bumper systems was compared to 1974 model steel bumper systems for passenger cars. The relative steel bumper and soft bumper weights and costs are examined in detail for five mph designs and the soft bumper is examined also for seven mph designs. It is concluded that the state-of-the-art in elastomeric material development and application is sufficiently advanced to support the introduction of soft-face bumpers in passenger car production applications. The replacement of steel bumper parts with soft bumper parts can provide consumers with significant savings in weight, cost, energy and repair costs in low speed accidents. It is further concluded that an orderly transition to full production of soft face bumper systems in 10 million cars annually can be accomplished in approximately 48 months.

by R. H. Compton; C. Westphal, Jr.; R. Crone  
National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 55p 2refs  
A study on engineering, economic and national resource feasibility of no damage soft face systems compared to current 1974 model steel bumper systems relative to Title I Bumper

Standard, Motor Vehicle Information and Cost Savings Act  
(PL 92-5:3)  
Availability: NHTSA

HS-801 321

#### **DWI LAW ENFORCEMENT TRAINING PROJECT. STUDENT MANUAL**

A student manual is presented which is intended to serve as a workbook to assist the law enforcement trainee in successfully completing the Drinking While Intoxicated Law Enforcement Training course. The program, when implemented nationally, should improve the alcohol enforcement activities of police officers. The content materials deal with: orientation; administration of pre-test examination study plan; nature and types of forms used in alcohol enforcement; effects of alcohol on human body; nature and scope of drinking driver problem; drinking and driving incidents, characteristics and patterns; selection of the patrol area; nature and description of detection task; types of identification detection clues that indicate DWI; determination of enforcement action from detection clues in a given environment; relating identification detection clues to environment; detection of drinking driver clues while apprehending the vehicle; field contact in pre-arrest investigations; pre-arrest investigation at accidents; citation or release of the non-DWI driver; providing care for persons needing medical attention; arrest of drinking driver suspect; recording and documenting evidence; conducting records check; use of psychophysical evaluations to determine extent of alcohol impairment; recording of psychophysical test information; assessing drinking subject's appearance and speech; determining mental state; chemical testing; degenerative effects of alcohol; legal authority such as implied consent law; case presentation and testimony in court; and course review and evaluation.

by J. E. Carnahan; D. M. Holmes; J. A. Keyes; J. D. Stemler;  
C. L. Dreveskracht  
Michigan State Univ., East Lansing. Hwy. Traf. Safety Center  
Contract DOT-HS-334-3-645  
1974 ; 364p  
Availability: GPO \$3.80

HS-801 322

#### **OCCUPANT SURVIVABILITY IN LATERAL COLLISIONS. PROGRESS REPORT NO. 4, 1 NOVEMBER TO 30 NOVEMBER 1974**

The feasibility is investigated of modifications to the vehicle interior and glazing which, when combined with structural modifications to upgrade compartment integrity, will allow occupants to survive severe lateral collision accidents in a completely passive manner. Main elements of the project are: performing base line lateral collision tests; investigating advanced interior padding and glazing materials and configurations; performing lateral collision tests of the modified vehicles; and making recommendations relative to improving lateral impact protection. A 90 degree side impact crash test was performed at 29.4 mph, for which data will be presented in a future report after processing and reduction. Data for the

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first series of glazing development tests are presented in tabular form, including head form drop test data.

by J. E. Greene  
Calspan Corp., Buffalo, N. Y.  
Contract DOT-HS-4-00922  
Rept. No. PR-4 ; 1974 ; 13p  
Availability: NHTSA

HS-801 325

**THE INFLUENCE OF TIRE PROPERTIES ON PASSENGER VEHICLE HANDLING. VOL. 3-- APPENDICES A - E. FINAL REPORT**

Properties of tires that affect vehicle dynamic response are examined, and those effects are described in quantitative terms. The degree to which the various tire parameters affect vehicle dynamic response is evaluated and their relative importance assessed. Appendices to this overall research program are given which include: a literature review and annotated bibliography of publications related to tire construction properties and performance parameters; a discussion of the development of mathematical functions of aligning torque and overturning moment and the development of automatic computation techniques for obtaining simulation tire model coefficients from measured tire data; a discussion of the vehicle test procedures employed in the study modifications of these procedures for testing in the wet, and the automatic computation techniques used to process the vehicle test data; complete simulation data sets for the four test vehicles used in this study; a discussion of a preliminary test program to evaluate the performance of a three component vehicle wheel force sensor.

by D. J. Schuring; D. T. Kunkel; D. E. Massing; R. D. Roland  
Calspan Corp., Buffalo, N. Y.  
Contract DOT-HS-053-3-727  
Rept. No. ZM-5350-K-3; PB-239 216 ; 1975 ; 147p refs  
Report for 30 Jun 1973 - 30 Jun 1974.  
Availability: NTIS

HS-801 326

**ALTERNATIVE BUMPER SYSTEMS FOR PASSENGER CARS**

The initial and total costs, weights, lifetime fuel consumption, lifetime net benefits and benefit/cost ratios of 10 bumper systems are compared. The systems studied range from the 1971 system representing pre-standard performance of soft-face systems offering high levels of damage protection. The report concludes that a four mph front, four mph rear impact speed, soft-face bumper system providing essentially no damage offers the greatest advantages considering all factors. Since this system requires three to four years lead time for mass production implementation, an interim system is recommended for the near term period. This interim system is a simplification of the model year 1975 system with reduced impact speed requirements. The interim system offers a significant overall advantage compared with the model year 1975 system and the minimal tooling changes can be made quickly.

by R. H. Compton; C. Westphal, Jr.; R. M. Crone  
National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 45p 3refs  
A study of ten alternative steel and soft-face bumper systems to determine benefits, weight, fuel and costs for various

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requirements relative to Safety Standard 215 and Title I Bumper Standard, Motor Vehicle Information and Cost Savings Act (PL 92-513)  
Availability: NHTSA

HS-801 327

**ANALYSIS OF EFFECTS OF PROPOSED CHANGES TO PASSENGER CAR REQUIREMENTS OF MVSS 208**

The impact of proposed changes to Motor Vehicle Safety Standard 208, "Occupant Crash Protection", is analyzed as they apply to passenger cars. Interlock-belt system effectiveness was compared with air cushion-lap belt system effectiveness in terms of reduced deaths and injuries. If the total passenger car population were equipped with the interlock-belt system, 7000 fewer fatalities and 340,000 fewer injuries could be expected annually. Comparable figures for the air cushion-lap belt system are 15,600 and 1,000,000. Using three different techniques for economic analysis, the benefit/cost ratios range from 2.9 to 5.2 for the interlock-belt system and from 3.6 to 6.0 for the air cushion-lap belt system. Results of the study show that the proposed rulemaking, represented by the air cushion-lap belt system, is clearly superior to the interlock-belt system in the reduction of fatalities and injuries. The air cushion-lap belt system is also fully justified even from an economic viewpoint since its benefit/cost ratio and its incremental benefit/cost ratio are substantially in excess of 1.0.

National Hwy. Traf. Safety Administration, Washington, D. C.; Department of Transp., Cambridge, Mass. Transp. Systems Center  
1974 ; 62p 18refs  
See also HS-801 328.  
Availability: NHTSA

HS-801 328

**ANALYSIS OF EFFECTS OF PROPOSED CHANGES TO PASSENGER CAR REQUIREMENTS OF MVSS 208. AMENDMENT, DECEMBER 1974**

The amendment presented contains changes which reflect the NHTSA response to public comments solicited in an NHTSA study on passenger car requirements, along with changes to MVSS 208 necessitated by Congressional action banning the seat-belt-to-ignition interlock and the continuous buzzer warning. Reduced motivation is expected to result in a reduction to 20% voluntary belt usage, having a profound effect upon societal benefits of future voluntary belt systems in the U.S. Substantial comments have resulted in: a new speed distribution for injuries; adjusted systems effectiveness estimates, increased for belts, reduced for air cushions, accounting for losses below deployment speed; and adjusted system cost estimates, itemized in more detail, reflecting new technology and ultimate production costs, and including contingency and lifetime operating costs. Progressing from lap shoulder belt systems to air cushion lap belt systems would ultimately save an additional 8900 lives and 492,000 injuries annually and the ratio of increased benefits to increased costs would be 4.2. Thus the air cushion lap belt system would be clearly superior,

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HS-801 336

primarily on the basis of safety, but also based on economic justification.

National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 53p 28refs  
Supplement to HS-801 327.  
Availability: NHTSA

HS-801 329

#### **HIGHWAY SAFETY PROGRAM MANUAL. VOL. 17-- PUPIL TRANSPORTATION SAFETY**

Guidance is offered to state and local governments on preferred highway safety practices with regard to public transportation. The volume supplements the Highway Safety Program Standards and presents additional information to assist state and local agencies in implementing their highway safety programs. Objectives outlined in the manual deal with licensing and examination of school vehicle operators, bus operator training programs, uniformity and safety in loading and unloading of school vehicles, child instruction as to safe riding behavior, school vehicle inspection and maintenance, and adequate records regarding crashes, injuries, and fatalities. General policy is outlined along with program development and operations, local government participation, and project funding.

National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 43p 16refs  
Availability: GPO \$0.95 Stock No. 5003-00174

HS-801 330

#### **TRAFFIC SAFETY HIGHLIGHTS, PROBLEMS AND PROGRAMS JUNE 1973 THROUGH JUNE 1974. A SUMMARY REVIEW**

The national traffic safety situation is reviewed, including highlights of the FY 1974 National Highway Traffic Safety Administration (NHTSA) program. Details are given on: traffic safety functions of NHTSA; the fuel shortage; alcohol abuse; crash survivability; crash avoidance; experimental safety vehicles and research safety vehicle; data bases for traffic safety, including accident investigation, fatality analysis file, Standard Accident File Extract, and National Driver Register; international developments in traffic safety; compliance and defect investigation; litigation; economics and traffic safety; the National Motor Vehicle Safety Advisory Council; Emergency Medical Services and Traffic Safety; motorcyclists; pedestrians and bicyclists; trained personnel; driver education and licensing; police services; traffic records systems; the courts; the advisory committees on traffic safety; consumer advocates for traffic safety; and traffic safety administration.

National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 39p  
Availability: NHTSA

HS-801 331

#### **SAFETY BELT USAGE: SURVEY OF CARS IN THE TRAFFIC POPULATION**

Safety belt usage rates in 1974 vs. 1973 cars were determined along with driver reactions to interlock systems, the extent,

methods, and reasons for defeat or circumvention. System reliability, comfort and convenience aspects were also evaluated. Data collected in the survey through observations and interviews is presented in statistical charts and graphic form. The significance of the findings is not defined.

Opinion Res. Corp., Princeton, N. J.  
Contract DOT-HS-4-00805  
1974 ; 42p  
Availability: NHTSA

HS-801 332

#### **BLOOD-ALCOHOL PROFICIENCY TEST PROGRAM. INTERIM REPORT**

A preliminary survey conducted to ascertain the validity of the blood alcohol analysis performed by a number of laboratories on a voluntary basis is reported. Values of accuracy and precision of the tests are presented. A significant difference is noted in trends for target vs. mean values for blood and aqueous samples.

by A. L. Flores  
Department of Transp., Cambridge, Mass. Transp. Systems  
Center  
Rept. No. DOT-TSC-NHTSA-74-5 ; 1974 ; 22p  
Report for Sep 1973 - May 1974.  
Availability: NTIS

HS-801 333

#### **REBREATHED AIR AS A REFERENCE FOR BREATH-ALCOHOL TESTERS. INTERIM REPORT**

Deep lung sampling performance tests, the accuracy with which an instrument measures blood alcohol by measurement of breath alcohol, are conducted. Only after several hours have elapsed is the blood alcohol concentration uniform throughout the body. Diffusion of alcohol from the pulmonary capillary blood into the alveolar air sacs deep in the lungs proceeds rapidly and efficiently because of the very large gas exchange surface area of the lungs. While measurement of the alcohol concentration in the alveoli is not straightforward since the concentration in the exhaled breath is modified in passage through the airways linking the alveoli with the external environment, the use of rebreathing techniques allows for the collections of samples which are more representative of alveolar air than collection by simple exhalation techniques.

by A. L. Flores  
Department of Transp., Cambridge, Mass. Transp. Systems  
Center  
Rept. No. DOT-TSC-NHTSA-74-4 ; 1974 ; 25p 5refs  
Report for Sep 1973 - May 1974.  
Availability: NTIS

HS-801 336

#### **UNIFORM TIRE QUALITY GRADING. TREADWEAR. FINAL REPORT. VOL. 1 AND 2**

The Uniform Tire Quality Grading proposes a procedure whereby NHTSA specified control tire is used to determine the suitability of the test route. A route that would yield the desired wear rate for the control tires was established and verified. It was also verified that slight changes in wear rate



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could be obtained by changing the cornering speed on specific parts of the route, and that the control tire was responsive to both slight and major changes in the route. The control tire used (General SAE Traction Tire, 7.75-14 Bias Construction) showed good reproducibility as to wear data. All four tires used in the route determination showed wear rates within a 1% spread. The four tires used as controls for the 16,000 mile test showed wear rates within a 5% spread. The two D78-14 sets of tires tested showed that the average wear rate for the set that operated at 24 psi (cold) inflation with a test load of 1008 lbs was 63.1%. The set that operated at 32 psi (cold) inflation with a test load of 1188 lbs was 55.7% worn. When both were rated using the Treadwear Rating Calculation method, the 32 psi tires rated 120.6, while the 24 psi rated 106.9. This represents a percentage change of 11.4%. Because of the sample size, definite conclusions could be erroneous; but the difference would seem to be significant enough to conclude that the higher the inflation pressure, the higher the treadwear rating for the same type of tire. Appendices present detailed results of the testing.

Compliance Testing, Inc., Ravenna, Ohio  
Contract DOT-HS-4-00811  
Rept. No. DOT-TST-72-1 ; 1974 ; 99p  
Availability: NTIS

HS-801 338

#### MODEL POLICE TRAFFIC SERVICES POLICIES.

Materials are presented which constitute a comprehensive compilation of police traffic services policies, procedures, rules and regulations. They should be readily and easily incorporated into an existing traffic program or into one currently being implemented. Major areas considered include the need and mandate for policies; background and methodology of effort; the use of policies; index of police traffic services policies, such as traffic law enforcement, accident investigation, control and direction of traffic, motorist services, administrative regulations, and staff and administrative services. An appendix provides a manual for guidance in uniform enforcement of traffic laws.

International Assoc. of Chiefs of Police, Washington, D. C.  
Hwy. Safety Div.  
Contract DOT-HS-036-3-712  
1974 ; 267p 2refs  
Prepared for the National Hwy. Traf. Safety Administration,  
Washington, D. C.  
Availability: NHTSA

HS-801 339

#### BRAKING SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITIES, NOVEMBER 1974

The Vehicle Braking Systems Road Test and Component Evaluation Program is reviewed in terms of the MVSS 105-75/MVSS 121 Vehicle Test Program, air brake hose fatigue testing, and work planned for the next report period. Activities of the Chemistry Laboratory are also described, including a research project to evaluate the fluid temperature at which partial loss of brakes occurs in the vehicle as the result of vapor locking (SAE R-18 Project), and the Markey Vapor

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Lock Tester evaluation. Detailed data for this report period are not included.

by R. J. Forthofer; P. J. Brown  
National Hwy. Traf. Safety Administration, Washington, D. C.  
Rept. No. PR-Nov-74 ; 1974 ; 17p  
Availability: Reference copy only

HS-801 340

#### UNIFORM TIRE QUALITY GRADING. CALIBRATION AND EVALUATION OF THE TREADWEAR TEST COURSE. FINAL REPORT

A treadwear test course was established and tested, using Course Monitoring Tires (CMT) to estimate the changes in course severity. These tires were Goodyear Custom Stealgard radials, General Belted Jumbo 780 bias belteds, and Firestone 500 P.E. bias ply tires. Average rates for the CMT on the course were established, and the variability of the CMT within each batch were estimated. At the 95th percentile, the bias belted CMT had the largest variation for averages of four from the projected mileage, and it was less than 12%. For the radial, the variations at the 95th percentile were less than 8% and for the bias less than 4.5%.

by F. C. Brenner; A. Kondo  
National Hwy. Traf. Safety Administration, Washington, D. C.  
Rept. No. T-1008 ; 1974 ; 14p 2refs  
Availability: NHTSA

HS-801 342

#### DEVELOPMENT OF BRAKING-IN-A-TURN TEST PROCEDURES. MONTHLY PROGRESS REPORT NOS. 1-4, 1 July 1974 - 31 October 1974

The overall program objectives are: to perform developmental studies of braking-in-a-turn test methods in order to define two procedures (one permitting driver steering control and one for fixed control operation) with respect to test conditions, instrument requirements, test techniques, and performance metrics; and to refine the recommended procedures in an experimental program in order to determine an optimum complete test methodology. Specific procedures include steerability during emergency braking change-in-trim test. The first report deals with developing a plan of work and reviewing and devising preliminary test procedures. An appendix discusses a combined cornering and braking test. The second report covers the design of a brake force application machine, finalizing the test program, and acquiring and checking out the test vehicles, a Chevrolet Brookwood station wagon and a Ford Pinto sub-compact sedan. The third report deals with the installation of basic instrumentation in the station wagon, development and assembly of a brake force application device, and preliminary tests to define course layouts and procedures. The fourth report covers the performance of full-scale tests to acquire the multi-factor data base needed to define the recommended test procedure.

by R. S. Rice  
Calspan Corp., Buffalo, N. Y.  
Contract DOT-HS-4-00971  
Rept. No. PR-1; PR-2; PR-3; PR-4 ; 1974 ; 23p  
Availability: NHTSA



HS-801 338

HSL 75-4

could be obtained by changing the cornering speed on specific parts of the route, and that the control tire was responsive to both slight and major changes in the route. The control tire used (General SAE Traction Tire, 7.75-14 Bias Construction) showed good reproducibility as to wear data. All four tires used in the route determination showed wear rates within a 1% spread. The four tires used as controls for the 16,000 mile test showed wear rates within a 5% spread. The two D78-14 sets of tires tested showed that the average wear rate for the set that operated at 24 psi (cold) inflation with a test load of 1008 lbs was 63.1%. The set that operated at 32 psi (cold) inflation with a test load of 1188 lbs was 55.7% worn. When both were rated using the Treadwear Rating Calculation method, the 32 psi tires rated 120.6, while the 24 psi rated 106.9. This represents a percentage change of 11.4%. Because of the sample size, definite conclusions could be erroneous; but the difference would seem to be significant enough to conclude that the higher the inflation pressure, the higher the treadwear rating for the same type of tire. Appendices present detailed results of the testing.

Compliance Testing, Inc., Ravenna, Ohio  
Contract DOT-HS-4-00811  
Rept. No. DOT-TST-72-1 ; 1974 ; 99p  
Availability: NTIS

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International Assoc. of Chiefs of Police, Washington, D. C.  
Hwy. Safety Div.  
Contract DOT-HS-036-3-712  
1974 ; 267p 2refs  
Prepared for the National Hwy. Traf. Safety Administration,  
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Lock Tester evaluation. Detailed data for this report period are not included.

by R. J. Forthofer; P. J. Brown  
National Hwy. Traf. Safety Administration, Washington, D. C.  
Rept. No. PR-Nov-74 ; 1974 ; 17p  
Availability: Reference copy only

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by F. C. Brenner; A. Kondo  
National Hwy. Traf. Safety Administration, Washington, D. C.  
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Availability: NHTSA

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by R. S. Rice  
Calspan Corp., Buffalo, N. Y.  
Contract DOT-HS-4-00971  
Rept. No. PR-1; PR-2; PR-3; PR-4 ; 1974 ; 23p  
Availability: NHTSA

April 30, 1975

HS-801 366

HS-801 343

**DEVELOPMENT OF IMPROVED INFLATION TECHNIQUES. MONTHLY PROGRESS LETTER NO. 16, NOVEMBER 1974**

Progress is reported on a program whose objective is to develop an inflatable occupant restraint system which can protect right front seat passengers of automobiles in 50 mph frontal impacts, but which is not so violent an inflation as to injure an occupant who may be situated in the path of the deployed inflatable. Nine dynamic tests were made, all using the Hybrid II dummy at 50 mph, with the 31.5 g trapezoidal pulse. Seven of these tests were made in exploration for a suitable knee target design. A configuration was found which yielded femur loads less than the 1700 lb specification. Two repeats of this test showed good correlation. Trouble was again experienced with the analog digital conversion system at the subcontractor's, so final form data is not yet available for these tests. An appendix is provided with analog data sheets showing femur loads from all the tests.

by L. B. Katter  
Rocket Res. Corp., Redmond, Wash.  
Contract DOT-HS-344-3-690  
Rept. No. PR-16 ; 1974 ; 37p  
Financial data period covered includes 1 Nov - 6 Dec 1974.  
Appendix B is ACCEPTANCE TEST PROCEDURE FOR ASPIRATED INFLATABLE OCCUPANT RESTRAINT SYSTEM, by D. B. Walker.  
Availability: NHTSA

HS-801 366

**COMPOSITE MATERIALS IN AUTOMOBILE SIDE STRUCTURES. FEASIBILITY EVALUATION. MONTHLY LETTER REPORT NO. 12, 30 APRIL THROUGH 31 MAY 1974**

Progress on feasibility studies of composite material use in automotive vehicle side structures to improve the crashworthiness of the vehicle in side impacts is reported. Sub-elements of composite materials that will be used in fabricating the side structure of target vehicles were fabricated and subjected to dynamic drop weight impact tests. Data and information obtained to date substantiate earlier theoretical analysis involving the use of non-metallic composite materials in improving the crashworthiness of motor vehicle side structures. Minor revisions were made in the proposed technique for conducting vehicle/vehicle or vehicle/barrier drop impact tests. The test facility and type of data available from it are described.

Changes suggested would provide increased flexibility in testing and be more cost effective. Computer analysis was also conducted.

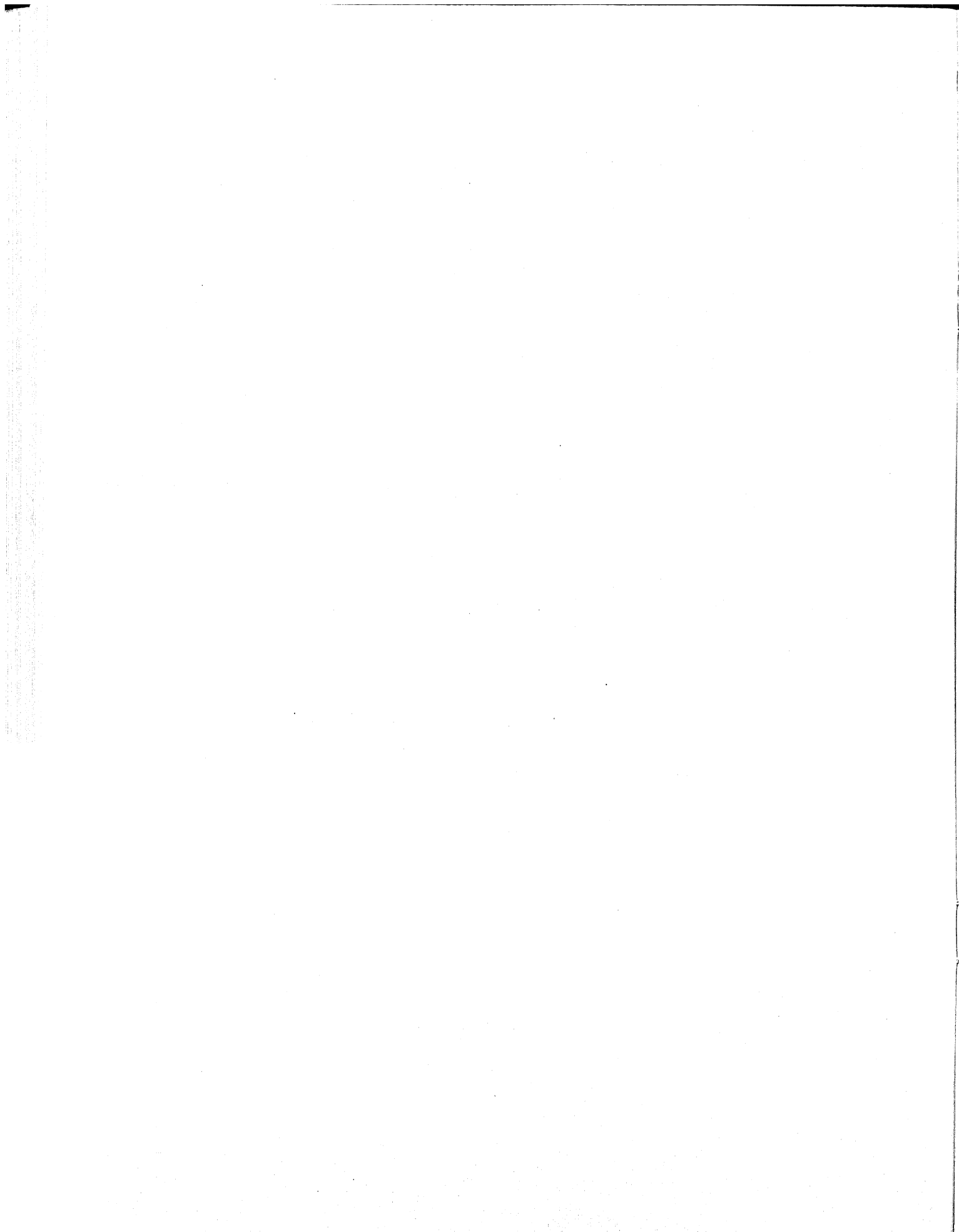
by W. H. Smith  
IIT Res. Inst., Chicago, Ill.  
Contract DOT-HS-105-3-680  
Rept. No. PR-12 ; 1974 ; 20p  
Availability: NHTSA

**ALCOHOL IMPAIRMENT OF PERFORMANCE ON STEERING AND DISCRETE TASKS IN A DRIVING SIMULATOR. FINAL REPORT. PT. 1: EFFECTS OF TASK LOADING. PT. 2: MODERATE VS. HEAVY DRINKERS**

A simplified laboratory simulator was developed to test two types of tasks used in driving on the open road: a continuous steering task to regulate against gust induced disturbances and an intermittent discrete response task requiring detection, scanning, recognition, and motor response typical of horn or brake operations. The development and details of this simulator, the many behavioral and performance measures, and some basic effects of blood alcohol concentrations of up to 0.11 BAC on a mixed group of 18 moderate and heavy drinkers is given in Part 1. Part 1 concentrates on the differences between continuous steering control and discrete peripheral sign response tasks both alone and combined, to establish the foundations of Part 2. Part 2 covers the main objective of this program, the differences in alcohol impairment of driving performance between moderate and heavy drinkers. This objective was successfully met using a cross section of 20 typical licensed drivers ranging in age from 21 to 65 years, 10 of each type of drinking habit. For selected cases, eye-point-of-regard measures were taken which gave new insights into the detection and recognition aspects of the discrete tasks. BACs equivalent to around 0.11% of moderate drinkers and 0.16 for heavy drinkers were used, with distinct and self-consistent differences noted between drinker types.

by H. R. Jex; R. W. Allen; R. J. DiMarco; D. T. McRuer  
Systems Technology, Inc., Hawthorne, Calif.  
Contract DOT-HS-227-2-388  
Rept. No. TR-1021-1 ; 1974 ; 63p 42refs  
Report for 1 Jun 1972 - 31 Dec 1973.  
Availability: NTIS  
Bayerische Motoren Werke A.G., Munich (West Germany)

9p



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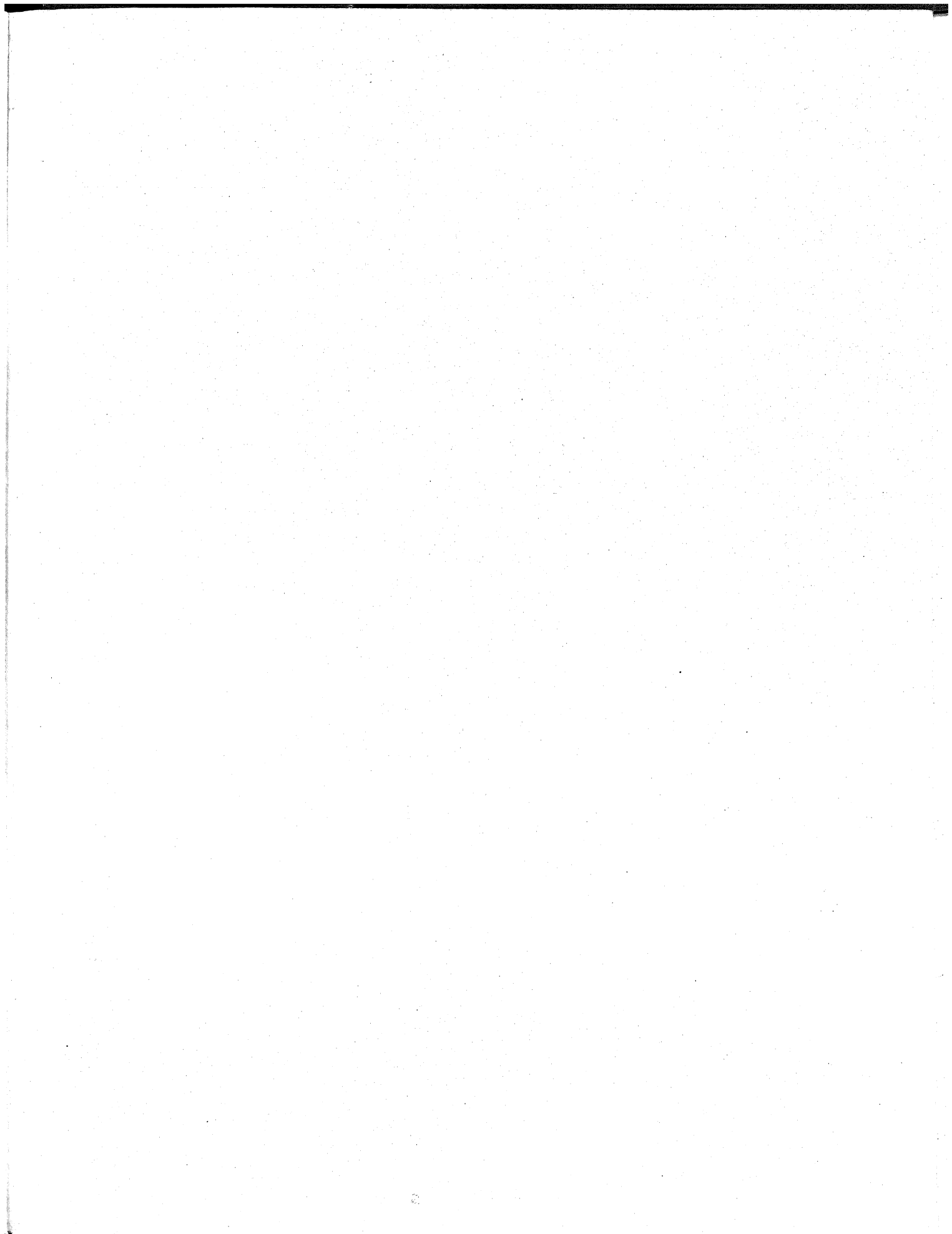
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